

CONTENTS of THE MENDOCINO TRAIL (1948)
of the Survey of MENDOCINO (16)

Box 24 (1948) 12

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CATALOGUE OF THE ARTIFACTS
FROM CAVE 248 OF THE SURVEY OF TAMAULIPAS

Survey under the direction of Dr. Richard S. MacNeish of the
National Museum of Canada. TMC 248 excavated by D. H. Kelley,
March and April, 1954. Catalogue prepared by D. H. Kelley,
August and September, 1955.

Projectile points.

Broken and unidentifiable.

Surface, 2.

West chamber, gravel, 1: S10W30 L5 (found deep in the gravel, this can only attest human occupation).

Level 2, 4: S5E25 L1b (a crude limestone point, broken at both ends), N5E5 L2, N10E20 L3, S15 L2 (probably originally a stemmed arrowpoint).

Level 7, 1: N10E25 L5. (base of a large point).

Concave base.

Flacco Indented.

Level 2, 1: S5E15 L2.

Others.

Level 2, 2: S5E15 L2, N15E20 L2.

Level 8, 1: N10E5 L2

Triangular points.

Tortugas Triangular.

Surface, 1.

Level 2, 2: E15 L2, S5E10 L2.

Level 5, 1: S5 L5.

Small thin triangular.

West chamber, 1: S10W30 L4.

Level 1, 1: N10 L1.

Small thick triangular.

Surface, 1.

Round-based points.

Surface, ~~44~~ 5.

Level 1, 3: N5E5 L1, N10E10 L1c, S5E5 L1.

Level 2, 8: S5E20 L2, N10E25 L2, N10E25 L3, S5E15 L1, S10E15 L1 (larger and heavier than most), N5E25 L1, N5E10 L2, N10E15 L2a (Mousterian technique).

Points, diamond-shaped and related forms.

Large

Surface, 2: (one is from S10W30 undetermined level)

Level 1, 2: N15E10 L1, N5 L1.

Small

Surface, 3. (including one from mixed levels, S10E10).

West Chamber, 2: S15W25 L2a (near triangular, possibly a scraper, dark stone, ink likely to wear off), S15W25 L2b.

Level 2, East Chamber, 5: S10E10 L2, N20E15 L2, S5 L2c, N5E5 L2, N5E5 L2.

Level 8, 1: S10E10 L8.

Level 6, 1: S5E5 L6. (broken specimen with subsequent burin blow, larger than those above and hence separated from them).

Langtry Stemmed points.

Surface, 5.

West Chamber, 2: S10W25 L3, S10W25 L3 (very elementary stem).

Level 1, 1: N10E15 L1.

Level 2, 4: N5E5 L2, E20 L2a, S5 L2, E10 L2b (very elementary stem).

Level 3, 2 (*) (see descriptions): S10E10 L3b, E25 mixed gravel (prob. L2b).

Valenzuela stemmed point.

Level 7, 1*: N5E30 L7/8.

Sandia type 1.

Level 6, 1: E20 L6/7a.

Pueblito stemmed point.

Surface, 1.

Other stemmed points.

Surface, 1.

West Chamber, 1: S10W25 L3.

East Chamber, Level 2, 2: S10E20 L2, N10E20 L4 (burial).

Stemmed arrow-points.

Level 2, 2: S15E15 L1, E15 L2.

Pestles.

Surface, in cave: 1, clay.

✓ Ground surface near cave: 1, stone.

Paint-stones.

✓ Level 1, 1: N10E5 L1.

Paint-grinding stone (?).

✓ Level 1, 1: N10E5 L1.

Discarded.

✓ One chisel-like stone from level 2 ~~NE~~ (N10E10 L3) ca. 166 mm. long by 32 mm. wide by 13 mm. thick with chips off one end, mostly fresh, probably in excavating or in transporting.

One limestone flake ca. 80 mm. wide by 133 mm. long by 10 mm. thick (N10E25 L5)--no signs of use.

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Quartz and quartz crystals.

Surface, 3.

Level 2, 4: S5E25 L1b, S5E25 L1b, S5E15 L1, N10E10 L4.

Level 4, 2: S5 L4, S5 L4.

Level 6, 1: S15E10 L6.

Meteoric fragments.

Surface, 3.

Level 4, 1: S5 L4.

Shell artifacts.

Pierced snail shells.

West Chamber, L: S10W25 L2 or L3 (one specimen, smashed in transit so badly it had to be discarded).

Surface, 2.

Level 2, 2: N10E20/N15E20 L2, N5E30 L2.

Level 3, 1: S5E5 L2.

Level 4, 1: S10E5 L4.

Level 7, 2: N5E10 L7, S15E10 L7 (tied to a ^{string}~~thread~~).

Pierced turtle shell.

Level 2, 1: E15 L2.

Pierced clam shell.

Level 2, 1: S10E20 L2.

Small shell rectangles.

Surface, 1 (unpierced).

West Chamber, 1: S10W25 L2 or L3 (2 holes).

Level 2, 2: S10E25 L2 (unpierced), N10E20/N15E20 L2 (one hole).

Level 3, 1: S15E25 L2.

Coiled Netting Basketry Technique.

Level 7, ⁴ 3: S15E10 L7 (1) (two large fragments), S15E10 L7 (2),
S20E5 L3, N5E20 L7 (?)

Lark's Head Knotted Basketry Technique.

Level 7, 2: N5E20 L6/7 (5 small fragments); unlabelled, probably
the same.

Coiled Netting Bag.

Level 3, 1: E25 L2b.

Simple Plaiting.

Level 1, 2: N10E10 L1, N5E10 and E10 L1

Level 2, 1: N15E10 L2.

Level 3, 1: S15E5 L2 (this specimen is about to disintegrate)
(2 pieces of 1 mat)

Level 7, 4: S15E10 L7, S10E5 L6a, S15E10 L7 (found in

excavating L6, not seen in situ; prob. from L7, just possibly from L3--fell apart when touched, and discarded), N10E10 L5 (disintegrated and discarded) (L5 here is the gravel, but this was the first square dug by the workmen, and clearly it belongs to a deposit just on or in the gravel, rather than a deep gravel deposit--not impossible it comes from a higher level).

Twilled Plaited Basketry.

Under-two-over-two.

~~Under-two-over-two~~

Surface, 4. (all show more than one thickness of weaving elements)

Level 1, 6: N5E10 and E10 L1c, N10E5 L1 (bad condition), N10E10 L2 (self-edge), N5E10 and E10 L1b (self-edge), ~~S15~~ S15 L1/2, N5E5 L1 (self-edge).

West Chamber, 3: S15W25 L2b (specimen disintegrated and gone), S15W20 Gray Ash, S15W20 Gray Ash (this label is a mistake as S15W20 was not dug, unless they were removed from the profile, noticed in cleaning, which is suggested by the fact that no level number is given; in that case they correspond to S15W25 L1; they consist of seven fragments from at least two mats, possibly three).

~~10~~ N10E20 L4 burial (very poor condition, just determinable)
Level 2, 8: E5 L2/3 (specimen disintegrated and gone), N15E10 L2 (2 frags. found elsewhere in pit)
L2 (3 fragments, found lying on a palm frond, in pit), N5E20 L2 (over 13 fragments, mostly in very bad condition, some with self-edge, probably all one mat with multiple weaving elements, though not always possible to tell this), N5E20 L2 (numerous tiny fragments), N10E10 L3 (³ fragments), (self-edge) (2 fragments)
N5E10 and E10 L2, E5 L3, N5E15 L3 (self-edge).

Level 3, 2: S20E10 L3/46 (13 fragments), S10E10 L3b (the ends of the elements are split to have twice as many at the edge, but the body must have been under-two-over-two, so it is catalogued here).

Label lost, 1

Under-three-over-three.

Level 2, 1: N15E10 L2 pit (just determinable, very small fragment)

Level 3, 34: S10 L3 (1) (same fragment has under-two-over-two),

S10 L3 (2) (same fragment has under-four-over-four),

S10E5 L3, S10E5 L4.

Level 4, 1

Coiled Split-stitch Basketry.

West Chamber, 3: S15W25 L2b (a), S15W25 L2b (b) (this broke into two fragments while being examined), S15W25 L2b (c) (this was found and removed some time before excavation of the square was completed by Peter Pratt, but was found very close to the other two fragments above, which were then left in situ)

Other Basketry Fragments.

Level 2, 2: N5E10 L2, S10E15 L2.

A level two net, N5E5 L2, is in MacNeish's possession and hence is not included in the analysis.

String.

Two-strand, right thumb down.

Surface, 5. (Including one with no label, and one labelled

S15W10, not in my handwriting, square not dug) (1 with 3 frags.)

Level 1, 5: N5E10 L1c (on bow), S10 L1 (on fire-tongs),

N5E10 and E10 L1b, N10E10 L1, N15E10 L1.

West Chamber, 4: S10W25 L1, S10W25 L1, S10W25 L3, S15W30 L1a

(made into something). (possibly cotton)

Level 2, 9: prob. N10E10 L4/5? (2 frags.), N5E15 L4, N10E20 L2,

N10E15 L2, S20E15 L1 (4 frags.), S10E5 L2, (a snarled-up

ball), N5E30 L2, N10E15 L2a (possibly leather), N10E15 L2a.

Level 3, 5: S20E10 L3/6/7, S15E10 L3, S10E5 L4, S15E10 L3,

S10E5 L3, S10 L3.

Level 4, 2: S5E10 and S10E10 L4/6.

Level 5, 1: S5W5 L5.

Level 6, 3: S20E5 L3 (2 frags.), ~~S15E5~~ S15E5 L3, S20E5 L3 (from
profile, while cleaning).

Level 7, 3: S10E10 L7, S15E10 L7, S15E10 L7.

Two-strand, right thumb up.

Level 2, 3 batches: ~~N15E10*L2*pit*~~ ~~N10E15*L2b*~~ ~~N10E10*bottom~~

N15E10 L2 pit (80 frags.), N10E10 bottom L3 (54 frags.),

N10E15 L2b (30 frags.) (all yellow, probably cotton).

Level 3, 1: S10E5 L3.

One-strand, right thumb down. Level 2, 1: N15E10 L2 pit (snarled
cotton-threads?)

Level 3, 2: S10E5 L3, S15E5 L2.

Level 7, 1: S15E10 L7.

String (*** cont.)

One-strand, right thumb up.

Level 7, 1: S15E10 L7.

Four-strand.

Level 3, 2: E25 L2b, S15E10 L3 (4 frags.).

Level 7, 2: both on 'coiled netting basketry' S15E10 L7.

Indeterminable.

Level 2, 1: N5E20 L2 (in bird-bone necklace, very delicate and fragile).

Machine-made.

West Chamber, 1: S15W25 L1. (actually two pieces fastened together into a loop by two square knots; these knots and the string are omitted from the artifact counts, but included here to make the catalogue record complete).

String 'belt'(?).

Surface, 1. This is made of threads of two strands, twisted together right thumb down, and should perhaps be added to the surface examples of the first category.

In the analysis, all knots are counted together, by levels, but here in the catalogue Fibre-knots not on artifacts, String-knots, and Knots on artifacts are made separate categories, as only the fibre-knots are not otherwise catalogued. A knot from level 4 (E25 L3) is with MacNeish and is not included in the catalogue or analysis.

Fibre-knots (not on artifacts).

Overhand:

Level 1, 3: N15E10 L1, N10E10 L1, N10E10 L1a.

West Chamber, 32: S10W25 L1, S15W25 L2b, S10W25 L1.

Level 2, 1: S5E30 L2.

Level 3, 1: S15 L3/5.

Level 6, 1: S15E5 L3.

Level 7, 1: S15E10 L7.

Level 5, 1: S5W5 L5
(effect is of a coil of
several fibres)

Square Knot.

Level 3, 1: S20E10 L3/6?

Surface, 1 (and 1 as part of intricate knot with some elements missing).

Unidentifiable.

Level 5, 1: S5W5 L5. (this was once an intricate knot, but at least one of the elements is missing and only the stiffness of the fibres still gives it a knotted appearance; *** duplicated in a more flexible material, it is not a knot at all any more).

String Knots. (already catalogued as string).

Lark's head

Surface, 1 (lark's head noose).

Level 1, 1: N5E10 and E10 L1c.

Overhand

Surface, 1.

Level 6, 4: S20E5 L3 (2), S15E5 L3 (2).

~~Butter~~ Square.

West chamber, 2: S15W25 L1 (2--on machine-made sennit).

Level 2, 1: S10E5 L2.

Level 6, 1: S20E5 L3.

Granny

Level 2, 1: S10E5 L2 (same string has a square knot in it, above).

Figure-of-eight

Level 7, 1: S15E10 L7.

Knots on artifacts.

Lark's head with single bow

West chamber, 1: S15W20 L1, knotted palm frond.

Lark's head

Level 7, 1: S15E10 L7, coiled netting basketry 'bag'. (lark's head around edge).

Overhand

West chamber, 1: S15W20 L1, knotted palm frond (around another fibre).

Level 1, 1: N5E10 and E10 L1c, leather object.

Level 7, more than ^{five} ~~four~~: S15E10 L7, coiled netting basketry 'bag' has one overhand fibre knot, two overhands on string, and a series of overhands knotted on each other at the end of the string; S15E10 L7 fibre holding snail shell, 1.

Square knots

West chamber, 7: all on S15W20 L1, knotted palm frond.

Level 1, 1: S10 L1, fire-tongs.

or level 3

Level 7, 2: S15E10 L7, fibre holding snail shell, 2.

Hangman's (?) knot.

Level 1, 2: N5E10 L1c, bow, knots at each end of bow-string.

Knotted Palm Frond.

West Chamber, 1: S15W20 (square not dug, removed from profile,
equivalent of L1 of S10W25 and S15W25).

Leather Object.

Level 1, 1: N5E10 and E10 L1.

Projectile points.

Broken and unidentifiable. Unfortunately, two of these are among the few points from down ~~bed~~ in pre-pottery levels.

Both of them are large ~~than~~ points, within the range of Tortugas Triangular. One of the others was apparently a small stemmed point, but just might have been diamond-shaped.

Concave base.

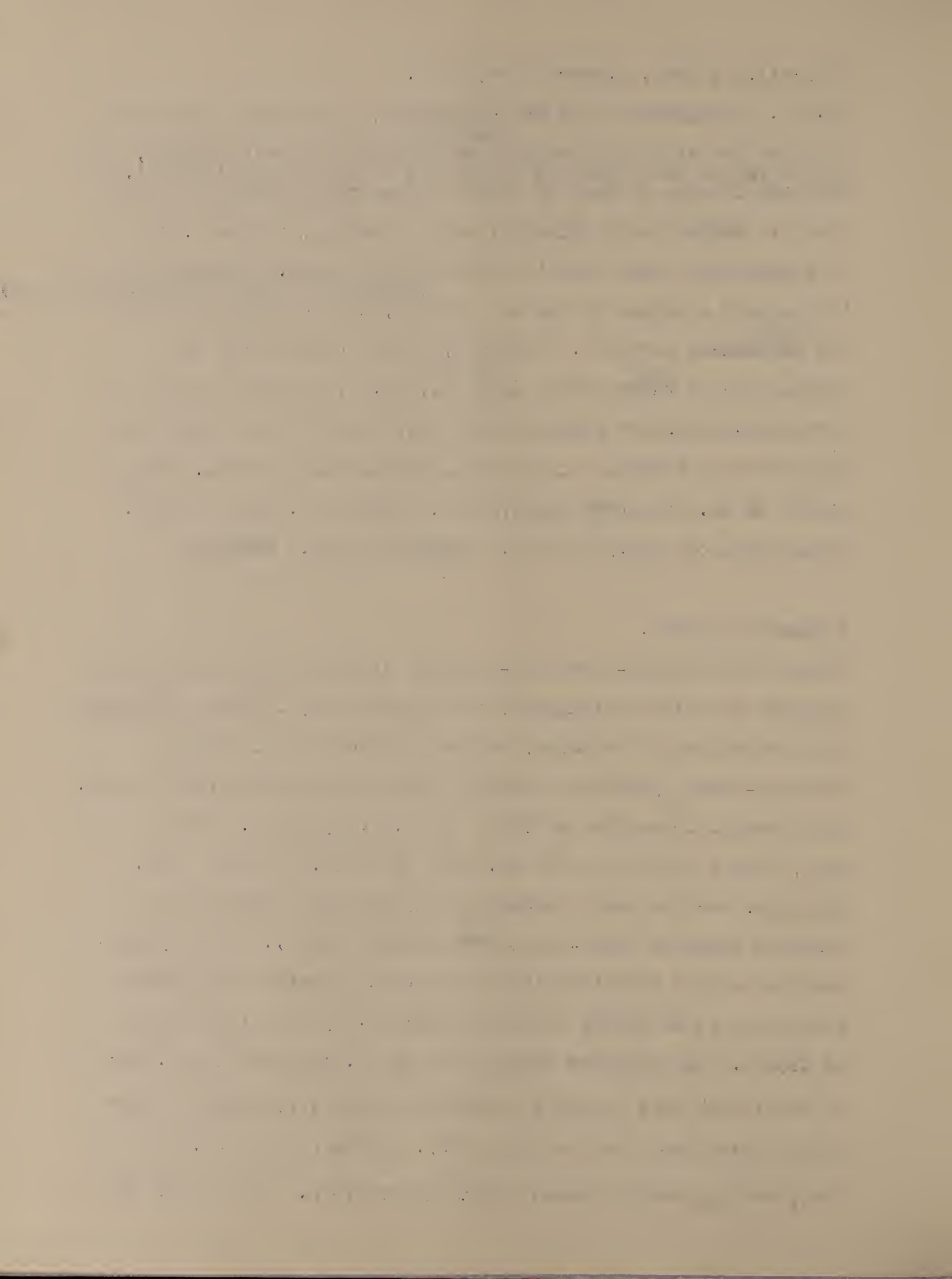
There are relatively few of these and they do not seem to form a single type. One is Flacco Indented Base (see description by MacNeish). One (N10E5 L2, i.e. the gravel) was thought by MacNeish to be a diamond-shaped point with the point broken off, but this would seem rather to be a deliberately indented base. Length 35 mm., width at sides of diamond 21 mm., width at base 8 mm., indentation 1 mm. The specimen S5E15 L2 ^{probably} corresponds to the Ventana type parallel-sided stem, sharp lateral tang, concave base which is a Chiricahua-Amargosa II type. ^(the "Pinto" point) Presumably it was dug up from lower in the cave, and it is most unfortunate that it was not found ~~in the~~ where it probably originally belonged. The specimen does not show a really sharp lateral tang, but there is a suggestion of a tang, and it clearly corresponds to the general type, perhaps slightly modified by a Plainview-Tortugas ^{clovis} tradition. Length 44 mm., width of stem 24 mm., length of stem 17 mm., width at tang 27 mm., concavity of base indented 6 mm. Stem shows smoothed edge, as in Plainview specimens. There is marked basal thinning. The specimen .
^{CHECK}
N15E20 L2 is quartzite, and remarkably well made for such a difficult material. It is virtually a duplicate of the 'Folsom' point from London, Ontario illustrated by Figgins (1934, plate I,

Projectile points, concave base, cont.

no. 2). I emphasize this ~~to~~ resemblance, because the specimen have been from TMC 248 would not normally ~~be~~ classed as a Folsom point, even in the period when anything fluted was automatically 'Folsom'. The widest point is back of centre rather than forward of centre, there is ~~slight~~ basal thinning, but no fluting, and the width is considerably less than the usual Folsom point. Nonetheless, (though not found in controlled digs) the Ontario specimen is one of a series, some of which fulfill these all ~~the Folsom~~ criteria. Moreover, it is worth noting that another one of ~~this~~ ^{Figgins} series (Plate I, no. 8) is very like the previously discussed specimen S5E15 L2, save that it lacks the suggestion of tanging. The specimen N15E20 L2 is 60 mm. long, widest 40 mm. from ~~base~~ point, 24 mm., and 20 mm. wide at base. Indentation of cavity is 3 mm. Thickness 6 mm. ~~Equality~~

Triangular points.

Within the straight-based sub-category (the only one which should properly be called triangular) are three types, Tortugas Triangular (see definition by MacNeish) and two smaller types, a thin straight-sided type and a thicker type with slightly convex sides. The Tortugas Triangular S5 L5 is 73 mm. long, 28 mm. wide at base, flares slightly to 32 mm. wide at 28 mm. from the base. The upper section has a ground or polished edge (perhaps as ^a MacNeish suggests from wear of ~~the~~ binding thong). These points seem to be in a tradition like those of Plainsview and Clovis, which seem to be fairly closely related except for the fluting of Clovis. The specimen S5E10 L2 is 45 mm. long and 30 mm. wide at base, with very slightly concave base and very slightly convex sides (less than 1 mm. in each case). Another is 26 mm. wide at base, and apparently broken during manufacture. It was probably



Projectile points, triangular, cont.

designed to be between 65 and 70 mm. long. The remaining specimen, from the surface, is 26 mm. wide at base and 32 mm. wide at the point where it begins to narrow, 19 mm. from the base. Below this ~~it~~ it is broken. Grinding is apparent on one of these edges.

There are two of the small thin triangular points. The one N10 L1 is 17 mm. wide at base and 25 mm. long by 5 mm. thick, and made of chert. Specimen S10W30 L4 is 19 mm. wide at base, 28 mm. long, and 4 mm. thick.

(from the surface)
The small thick triangular point is 22 mm. wide at base by 25 mm. long and 7 mm. thick.

Round-based points. On the evidence from this cave~~at~~ alone, it would be neither possible nor desirable to separate Abasolo Round-based from Abasolo Triangular and Tortugas Round-based (see definitions of MacNeish), although I believe that ~~one~~ ^{two} points would be classed as Abasolo Triangular and two as Tortugas Round-based if this were done. Other variations may prove equally significant, ^{when more is known of other nearby areas.} Several of the points are much narrower ~~than~~ than is usual among Abasolo points, and all of them are at the smaller end of the Abasolo range. There is no point in attempting to make these finer distinctions at this time, as their temporal significance can't even be guessed at. Since there are ~~fifteen~~ ^{sixteen} points in this category, all from level two, level 1, or the surface, but none from the west chamber, it seems very likely that they were all dug up from older levels, and their present position has no value at all. One of them, a good ^{N10E15 L23} Abasolo round base in shape, is a typical Mousterian point in technique (and in shape). The ~~it~~ only American example I

Projectile points, round-based, cont.

know from previous excavations is that shown by Aveleyra, Plate VII, from Guanajuato, which is a considerable distance away. The artifact in Ventana, fig. 53, h looks as if it might have been made by Mousterian technique, but the other side is not shown, and no note occurs in the text about what would seem to be a rather unusual type in America.

Diamond-shaped and related forms.

Two large diamond-shaped forms from the surface seem unrelated to each other or any other artifacts found. One is only presumed to be diamond-shaped, as it is broken just at the point where the sides cease to widen. Here, presumably at the widest point, it is 29 mm. wide. It narrows from here to a point of the diamond at 24 mm. However, it is clear that this was not the point of the artifact, if it was a projectile point, as it is decidedly rounded off. The thickness is only 4 mm., and the working is very fine and careful. There is a small break in the other one, which prevents measuring the length, but it must have been about 58 mm. long. The width is 35 mm., and thickness about 7 mm.

Another one (N5 L1) is likewise broken. The length to the point about 38 mm. where the curve of the edge reverses is ~~40 mm.~~ and the two curves ~~***~~ and I would guess the original length to have been about 56 mm. The original ^{width} ~~length~~ may have been about 26-27 mm. The thickness is 5 mm. The specimen N15E10 L1 is 41 mm. long by 19 mm. wide. The basal end is slightly rounder. It is from a good level 1 deposit (the previous specimen is from a rather thin and dubious level 1 deposit) and most likely represents an artifact of the latest occupation period. A quite different

Projectile points, diamond-shaped, cont.

~~Same~~ diamond-shaped point is attested as early as L6 or possibly level 7, S5E5 L6. This is 38 mm. long by 25 mm. wide by 8 mm. thick. It was broken near the back end, and a burin blow had been struck along the break, probably so that it could be used anyhow. The undoubtedly accidental result is rather like Ventana fig. 59,f (the Gypsum-like points of Chiricahua-Amargosa II) or even Sandia. It is an interesting possibility that the use of stems developed in some such accidental fashion. The remaining eleven points are small (25-30 mm. long, 16-20 mm. wide, 4-6 mm. thick) and vary considerably in shape. Some are true diamonds, others somewhat flattened diamonds; some could probably better be classed as triangular on purely formal grounds and one could conceivably have been classed as a small triangular scraper, rather than a diamond-shaped projectile point. Nonetheless, I think it likely that they form a unit. Two are from the west chamber (one the 'scraper', the other a point which might be classed as Catan Round-base). Three of these were found in square S10E10. One was found, allegedly in the lowest part of the gravel, after the removal of a large boulder which should have prevented any possibility of mixing; another was found in the gravel of the same square, but in an area where mixing was likely and was therefore labelled simply 'surface' in accord with MacNeish's policy of labelling doubtful specimens. There was no reason to suspect that the point did not come from the gravel except that it seemed to have some dirt adhering, which was uncommon in the gravel. The dirt could not be matched in any of the layers of the square above. The third specimen may be unfinished or may simply be somewhat cruder than the other

two, and subsequently broken. The former seems more likely, as one side is quite well done. This is from level 2, and made of a chert very like the specimen which I assumed came from the undisturbed gravel. (The other specimen is also made from a somewhat different chert). The most likely explanation would normally be that it had been dug up from below by the people of level two, but they do not seem to have dug into the gravel too often, and its presence makes the adhering dirt of the gravel specimen seem somewhat more suspicious. Some of this dirt has been left on the specimen, but is still no help. The concave-based diamond-shaped point from the gravel and the larger diamond-shaped point from level six are sufficiently different so that they don't throw much light on the problem. It seems probable but not proven that small diamond-shaped points are a feature of the earliest occupations in the caves. These three compare quite closely with Ventana fig. 57 c as to size and shape. One of the surface examples is like fig. 57 a. Another, N5E5 L2, is very like the three from S1OE10, but has a rounded end where one would expect the point, and the other end is unfortunately broken off. It is also made of a decidedly similar chert.

Stemmed points, Langtry.

These are a Texas type within the Gypsum-~~Pinto~~ tradition.

From the presence of two in the west chamber it is clear that they survived to the late period, while at least* one and probably two are associated with level 3. The doubtfully associated one was in E25 in mixed earth, ^{from} cleaning the profile,, and has

Projectile points, stemmed, Langtry (cont.)

no physical data as to its position, but the adhering dirt was quite distinctive, and I am satisfied that it corresponded to the level 2b of this square, general level 3. In any case, the type is attested for this level by S10E10 L3b. At least two of these, E10 L2b and S10W25 L3, might on purely formal grounds have been classed as leaf-shaped or diamond-shaped, but morphologically they show a suggestion of a stem sufficient to warrant their classification with Langtry stemmed. Lengths vary from 35 mm. to 48 mm., widths from 17 to 27 mm., thickness from 5 to 8 mm., length of stem from 3 to 15 mm. With the exception of ~~most~~ c,d,f-j the specimens closely resemble those of Ventana fig. 59. Their first appearance in the Valley of Mexico seems to have been in Ticoman times. At Uaxactun, points which may ultimately derive from the same tradition, are much larger and mostly of Tzakol times.

Valenzuela Stemmed.

A single obsidian point, broken, from level 7 or 8 obviously represents a type, although equally obviously only the specimen and not the type can be described. This might be a considerably larger prototype for the Langtry Stemmed points above. Width at the break (which was probably still getting larger) 27 mm. The stem is marked off by a shoulder less than 2 mm. deep on both sides, 15 mm. on one side and 10 mm. on the other from the base. The fact that the sides continue to curve out, in much the same plane, beyond the point of junction of stem and body, is a marked difference from the Langtry type. No Ventana specimens illustrated conform to this type, and I have not seen it elsewhere.

Projectile points, continued.

Sandia type 1. The point which I have classed as Sandia type 1 probably does not correspond exactly to the type as defined, but a clear attempt to make a stem by cutting a notch on one side only is sufficiently rare to suggest that this point is in the Sandia tradition, making due allowance for local and probably temporal differentiation. The base is unfortunately broken off. The length from point to shoulder is 51 mm., width at the shoulder ca. 24 mm., width of the stem at the break about 14-15 mm., thickness at break 6 mm., at thickest point about 8 mm. One surface is relatively flat and the other is evenly curved, giving a cross section: . The material is a green stone, apparently the same as that from which the Tortugas Triangular S5L5 was made. Another point from the surface, broken, seems to show notching from one side at about the place of the break, with clearly nothing on the other edge, but it is so different in shape and character that it almost certainly has no connection with this one.

Pueblito Stemmed. This is a type related to Pinto Stemmed, with the straight rather than concave base. The point is broken but the length must have been about 55 mm. The width is 33 mm., the width of the stem 20 mm., the length of the stem 11 mm., the thickness ca. 6 mm.

Other Stemmed Points. These include^d the large white chert point N10E20 L4, a ceremonial point accompanying the level 2 bundle burial. Length 87 mm., width 48 mm., length of stem 12 mm., width of stem 33 mm., one tang 8 mm. long, one tang 2 mm. long.

Projectile points, stemmed, cont.

The point was probably made for the burial, and one tang broken off accidentally during the making, and simply rounded off-- at least that is what the asymmetry of the tangs suggests.

Another point, from the surface, is broken at both ends, but enough remains to show that its width was 43 mm., and the width of its stem 24 mm., thickness 3 mm. (!). Another broken point, S10E20 L2, must have been about 55 mm. long originally, is 32 mm. wide, stem 16 mm. wide, stem length ca. 9 mm. (the base is markedly concave, making it difficult to decide to just what point the stem should be measured), tangs ca. 4 mm. long and quite rounded. The closest illustrated similarities in Ventana are fig. 65, a,b, which are considerably smaller. Still another type is represented by a point from the west chamber (S10W25 L3), with the base broken off. It is a leaf-shaped, stemmed point, with the broadest part below the base of the stem. Length to break (which includes all of stem) 35 mm. Width 29 mm. at 25 mm. from base. Width of stem ca. 17 mm.

Stemmed arrow-points. There are only two of these, both from level 2. Specimen E15 L2 is 26 mm. long, 19 mm. wide, stem 8 mm. long, 7 mm. wide, thickness ca. 3 mm. Specimen S15E15 L1 is 27 mm. long, 22 mm. wide; width of stem where it joins body, 11 mm., width of stem at base 15 mm., thickness 5 mm.

Description of 'bifacial saw-like choppers'.

These are usually large spalls of limestone, unmodified in any way except by the bifacial chipping resulting from use. MacNeish distinguishes two categories, a thin-edged type and a thick-edged type, but they intergrade thoroughly, and a chi-square test shows no significant variation in their distribution through the various layers of the cave TMC 248; although catalogued separately, there seems to be no adequate reason for distinguishing them. Apparently almost any fairly large, fairly flat stone which could be held in the hand was apt to be used,, and the thickness or thinness of the edge would depend solely on the size of the original stone. A typical specimen was 142 mm. long by 98 mm. across by 22 mm. thick. Their closest parallels in the Ventana materials ~~are~~ are the two thin bifacial 'flake choppers' from the volcanic debris layer.

Description of 'large bifacial disk choppers'.

The five tools put in this category do not really seem to form a unitary type, and four of them may not even be choppers.

One, from east 5, L2, shows clear marks of having been used as a chopper, but the other four show few or no use marks. The

one from S10E5 L4 is extremely carefully made, yet shows no signs of having been used as a chopper. Its diameter is 68-

69 ^{mm}~~centimeters~~ and it is 40 ^{mm}~~cm~~ thick at the thickest point.

Large flakes have been removed from it bifacially, and there is no secondary chipping. The smallest specimen (from the surface)

is 56-57 ^{mm}~~cm~~ in diameter and 31 ^{mm}~~cm~~ thick. They clearly fall

within the range of the Ventana discoidal choppers, which they

closely resemble except that they lack signs of having been

used as choppers. The one from S5 L2c is 85-90 ^{mm}~~cm~~ in diameter

and may be a large reworked flake, rather than a core; despite

its roughly discoid shape, it more closely resembles what I

have elsewhere called 'flat-surfaced thin pebble choppers'.

It is only 15 ^{mm}~~cm~~ thick, and not only shows no clear signs of

use marks, but is not even consistently ^fbifacially flaked. The

remaining specimen from the surface is intermediate between the

last-discussed specimen and the true discoid chopper first mentioned,

and shows ~~one~~ a few scars which could be due to use.

E15 L4 closely resembles S10E5 L4.

Description of 'flake chopper'.

This artifact seemed distinctive enough to warrant a separate description. It seems to have been made from a relatively flat section from a pebble, about 23 ^{mm} cm. thick; an edge was subsequently made by the removal of several large flakes, and the edge was then battered, leaving the typical small use scars of a chopper. Its longest dimension is 76 ^{mm} cm., and its width 70 ^{mm} cm.

Description of 'flat-surfaced thin pebble choppers'.

The name is not too adequate as the chief common characteristic of these choppers is that they have ~~at least one flattish surface~~ two roughly parallel flattish surfaces, differing in this from the ones classed as 'pebble choppers'. One from the surface has been modified to a roughly discoidal shape, somewhat resembling the 'large bifacial disk chopper' from S5 L2c. Another from the surface, showing only slight traces of use as a chopper, resembles the 'large bifacial disk chopper' from S5 L2c, particularly in the absence of clear indications of bifacial working. One of these from N5E30 L7/8 (i.e. level 7, a very old deposit) shows one nearly rectangular edge which makes it look very much like a broken rectangular or oval mano (or just possibly a piece of a broken shaped block metate) reshaped for use as a chopper. The range is from 65 to 90 ^{mm} cm. in length and from 20 to 37 ^{mm} cm. in thickness. The only chopper found in the gravel was of this crude type.

Some of these may correspond to the Ventana category of 'sharpened flake' choppers.

Identification of 'Panicum'.

This species is a very common one in the
description. It seems to have been found in
the region from a point, about 25 mi. from the
southern end of the coast of the Gulf of Mexico, and
the edge of the land, near the point where the
it is located. The species is found in the
in the

Description of 'Panicum'.

The name is not for the species in the
of these species is that they have been
two species of the same genus, but in the
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of the same species.

One of these species is the same as the other.

'Panicum'.

Description of 'pebble choppers'.

These mostly correspond to the 'spheroidal pebble choppers' of Ventana, although there may also be some overlap with the Ventana type of 'partly trimmed core choppers'. Diameters range from 63 to 107 ^{mm} ~~cm~~., and thicknesses from 30 to 57 ^{mm} ~~cm~~.. Generally speaking, a rather curved surface has been produced by knocking off large flakes, and the sharpened edge thus produced has then been used as a chopper. In one case (S5E5 L3/4/5) although the original pebble had been broken to make the artifact, it was the original unmodified edge which was used as a chopper.

One specimen (N5E25 L3) may actually be an exceptionally large disk chopper (diameter ca. 85 ^{mm} ~~cm~~.) but clearly actually used as a chopper, unlike the majority of artifacts labelled above for convenience as 'disk choppers'. Two specimens (very closely similar, one from the surface, one from E25 L5, i.e. level 7) show clear signs of having been used in some way which put a very smooth polish on their under surfaces. The one from the surface shows ^{no} ~~very~~ clear signs of use as a chopper, despite its very close resemblance to the one from level 7, which does show such signs very clearly. Apparently the polished surface and the battering marks result from different uses of the tool.

N5E20 L2 looks like a re-used 'scraping plane'.

Description of 'unmodified pebble chopper'.

As the name implies, this is simply a pebble with a relatively sharp edge which was picked up and used as a chopper.

Investigation of 'Pebble shapes'.

These mostly correspond to the 'epheral pebble shapes'.

Of course, although there may also be some overlap with the various types of 'gully erosion' and 'shallow' erosion. From 50 to 100 m. diameter, a rather curved surface has been produced by working out large blocks, and the associated area has produced the same as a gully. In one case (Fig. 15.4.2) although the original pebble had been broken to cause the effect, it was

the original unmodified shape which was used as a model.

The specimen (Fig. 15.4.3) may actually be an epherally large

dist. shape (Fig. 15.4.4) but usually roughly and

as a gully, unlike the majority of epherally shaped stones

for comparison as 'dist. shapes'. The specimen (Fig. 15.4.5)

similar, one from the surface, one from 100 m. level (1)

and other signs of being used in some way which are

very much better on their own surface. The one from the

surface shows very clear signs of use as a gully, despite the

very small resemblance to the one from level 1, 100 m.

and from signs very clearly. Although the gully surface

and the existing marks would be different from the one

Investigation of 'modified pebble shapes'.

As far as shape, this is mostly a pebble with a relatively

small, sharp, and curved surface, and used as a model.

Description of 'pebble smoother'.

This is a large pebble, broken in half, with the broken half used as a smoothing implement, giving it a highly polished surface.. Some of the 'pebble choppers' may have been similarly used when not ~~used~~ being used for chopping.

Director of 'Public Health'.

This is a large house, modern in style, with the main hall

and a small room, fitted in a single column.

Further, some of the 'public health' may have been similar

and what are used today for the purpose.

Description of hammer stone(?).

This specimen is very different from what have usually been described as 'hammer stones' resembling in shape the 'scraping planes' except for the fact that it lacks a smooth under surface which could be used as a plane. However, along one edge it shows signs of use. These are rather ground down, and completely unlike the scars on the 'choppers'. Experiment with specimens discarded as probably not artifacts showed that such an edge was formed when a stone of this sort was struck against a slightly harder stone with a direct blow.

This specimen is very different from what have usually been
described as 'human bones' resembling in shape the 'human
bones' known for the fact that it lacks a narrow under surface
when seen from above. However, along one edge it
shows a line of view. There are rather small bones, and especially
unlike the shape of the 'human bones'. In contrast with specimens
described as 'human bones' not exhibiting such a deep edge
was found when a stone of this sort was struck against a
slightly harder stone with a direct blow.

Clear-Fork gouge.

This consists of a relatively long, narrow, fairly flat stone, broken off flat at one end and broken off with a curving gouge end at the other. One of the specimens is 98 mm. by 54 mm. by 20 mm., the other is 64 mm. by 32 mm. by 17 mm.

Small gouge.

This would seem to represent the eighth section of a small rock, flaked to give a curving gouge edge, going into what might be a graver point. Along the curved edge and the point is fine flaking either due to retouch or use. Dimensions 35mm. by 31 mm., by 20 mm.

Other gouges.

(5)
These are a miscellaneous lot of artifacts, sharing in common ~~only~~ an incurving gouge edge on one or more surfaces. They all seem to have been made of rocks which show at least one flat surface, and three of them show a sharp, nearly rectangular, edge on one or more surfaces, although not such as to give them a common shape. Rocks which had originally been rounded seem much more common, so this is probably worth noting, although it may be mere accident, with such a small sample of gouges.

Chertford Gorge.

This consists of a relatively long, narrow, fairly flat slope, broken off flat at one end and broken off with a curving edge at the other. One of the specimens is 24 mm. by 24 mm. by 20 mm., the other is 24 mm. by 22 mm. by 17 mm.

Small Gorge.

This would seem to represent the elongation of a small rock, broken off with a curving edge, being into what might be a greater point. Along the curved edge the point is fine, flaring either due to rotation on one. Specimens 24 mm. by 21 mm., by 20 mm.

Other Gorges.

These are a miscellaneous lot of specimens, showing in various ways an interesting gorge edge on one or more surfaces. They all seem to have been made of rocks which show at least one flat surface, and three of them show a sharp, nearly rectangular edge on one or more surfaces, although not such as to give them a square shape. Rocks which had originally been rounded seem much more common, so that it is probably worth noting, although it may be said incidentally, with such a small sample of gorges.

Large elongate end scrapers.

As used, this is a rather 'catch-all' miscellany of scrapers.

I would doubt that end-scrapers differed in any clear and recognizable way from side-scrapers, in the eyes of the people (in Tamaulipas--I don't reject the distinction elsewhere) who made them. The specimens on the one hand grade into the unifacial side-scrapers, on the other into gravers and gouges. It is not even clear that all of them were used in the same way. The large specimen from E10 L2 shows use-polish on both the upper and lower face. The specimen from N15E20 L2 shows use-polish on one face only, the same face also being badly scratched. A protruding bump on the bottom of the specimen from S5 L2 shows slight use polish. On the other hand, the specimen from N10E15 L2a shows unifacial ~~of~~ retouch or use flaking along one end, which clearly justify labelling it an end scraper. The other specimens generally show neither retouch nor polish in any very distinct way, although they generally look more like scrapers than anything else and show some degree of elongation which makes it more likely that they were used as end scrapers than side scrapers.

Humped
~~Keeled~~ Scraping Planes.

The distinction between scrapers and planes seems a difficult one to maintain. At Ventana, keeled oval scrapers were considered as "distinctly related by type to the keeled discoidal scrapers which in turn appear to be but miniatures of the plane" (i.e. presumably of the round plane). The large discoidal scrapers from the midden are distinguished from the planes because the planes are keeled (p. 234). Pebble planes, which do not clearly show keeling, seem very similar to the Ventana category of rough-flake scrapers. (although the latter are generally thinner) The lengths of Ventana rough-flake side scrapers are given as 60-115 mm. and the 'diameters' of the planes as 90-138 mm. In the Tamaulipas materials, I have distinguished between ^{humped} ~~keeled~~ scraping planes and 'flat scraping planes' within MacNeish's category of unifacial scraping planes. The latter intergrade with MacNeish's category of unifacial side-scrapers somewhat. The humped variety may or may not be keeled. The height is often nearly 90% of the length or diameter, and may even be greater than the length. An exceptionally small specimen is 53 mm. long by 31 mm. wide by 30 mm. high. A large specimen is 68 mm. by 70 mm. by 43 mm. high. Another is 85 mm. long by 59 mm. wide by 69 mm. high. A special problem is posed by 2 specimens from the west chamber (S15W25 L1/4) (S10W25 L3). The specimen (S10W25 L3) was originally classed as a chopper but shows no use scars, and has a high keel, unlike any of the choppers. Its bottom is extremely rough and uneven, and would not make a good scraping surface. The specimen S15W25 L3 also has a rough and uneven bottom which would make it unsuitable for a scraping plane, and a high keeled back. ~~The~~ It closely

The structure of the cell membrane is determined by the phospholipid bilayer. The phospholipids consist of a hydrophilic head and a hydrophobic tail. The heads are oriented towards the aqueous environment, while the tails are oriented away from it. This arrangement creates a barrier that is selectively permeable, allowing certain substances to pass while blocking others. The fluid mosaic model describes the cell membrane as a fluid structure with various proteins embedded in it. These proteins can move laterally within the membrane and perform a variety of functions, including transport, signaling, and cell adhesion. The thickness of the cell membrane is typically about 7-10 nanometers. The overall structure of the cell membrane is crucial for maintaining the cell's internal environment and protecting it from the external world.

resembles the specimen from E25 L4 which, however, has a much better scraping and smoothing surface on the bottom. No other artifacts resembling either a humped scraping plane or a pebble chopper were found in the west chamber, so the classification of these two artifacts becomes rather important. In this connection, it is worth noting that out of the ³⁹~~38~~ humped ~~scrapers~~ ^{scraping planes}, only ~~6~~ 7 may, with full justice, be called keeled ~~scrapers~~ scraping planes. Possibly these should form a separate category.

Flat Scraping planes.

These artifacts are intermediate between the humped scraping planes and the unifacial side scrapers, corresponding most closely to the Ventana category of 'rough flake side scrapers', although often somewhat thicker. They range in size from 43 mm. long by 41 mm. wide by 22 mm. high to 66 mm. long by 61 mm. wide by 42 mm. high, or to 97 mm. long by 86 mm. wide by 27 mm. high. Nearly all the smaller limestone artifacts come in this category.

Gravers.

Three of these artifacts were originally classed by MacNeish with unifacial scraping planes, and one was classed as a gouge. However, all of them share what looks to me like a deliberately made point, although no retouch was employed in making the point. Their shapes are quite different, lengths running from about 70-90 mm., widths from 60-80 mm., heights from 25 to 50 mm. They do not correspond closely to any Ventana type, although the 'pointed scraper' class is probably closest. Neither do they show the point scars which were used in determining Ventana gravers, but working wood would not cause such scars in this rock. The specimen S5E5 L3/4/5 was originally made on a very large limestone flake, and the other three seem to be core tools.

Pestles.

Only two pestles were found, one on the surface in the cave, the other found a short distance away from the cave by one of the men. The one found in the cave was made of clay, an orange-brown ware with a ~~large~~ large quartz temper, and was broken. There is no feasible habitation zone near the cave, as it is a very steep slope, and the stone pestle undoubtedly belonged to one of the inhabitants either of TMC 247 or of TMC 248. The stone one is 88 mm. long and 51-54 mm. in diameter on the pounding face, about 25-40 mm. in diameter of the handle and rounding off at the top. The clay one is broken, but the diameter of the pounding face is 38 mm. and the handle narrows from about 25 mm.

Paint-stone.

This is a limestone slab, 213 mm. long by 118 mm. wide by 21 mm. thick. One corner forms a nearly rectangular edge, and it is possible that the stone was originally much more regular in outline and has subsequently been broken, particularly as the edges at this corner seem much smoother. One surface is stained red, and rubbed smooth in the areas of red staining. Along this same surface runs a groove with no apparent purpose. It may be merely an irregularity in the original surface of the rock, given the appearance of design by the general smoothing of the rock around it.

Possible paint-grinding stone (*).

This is a simple pebble about 65 mm. long, 55 mm. across, and 35 mm. thick, rounded on all sides. It is smooth enough to suggest it ~~##~~ may have been used for polishing or grinding, and shows slight red stains on two sides. These are not obviously due to anything other than possible impurities in the rock, but the fact that this pebble was found in the same square and same level as the paint-stone above suggests that it may have been the grinding agent used* with the paint-stone.

Small discoidal scrapers. (MacNeish's 'small disk plano-convex scrapers') While it would be ridiculous to insist on the validity of sub-categories within a group numbering only 12 specimens in all, there are a number of quite clear and objective differences which may be valid. Eight of the specimens are between 33-38 mm. in maximum diameter; the other four are between ~~22~~ 20-25 mm. in maximum diameter. Within the larger group, 3 specimens have one face nearly flat and unworked; the other 5 specimens ~~all belong in MacNeish's category of 'small disk plano-convex scrapers' and~~ ^{two} show convex surfaces and working from both sides; moreover, they all show a slight tendency to elongation, slightly out of disk shape. The four smaller specimens show the same division: two of them ~~are~~ have flat surfaces, and are worked only around the edge, while the other two are worked from both sides, and both show a slight pulling out almost to a point at one point along their circumference. Moreover, the two 'pointed' ones are made from flint, apparently and both come from the same level of the same square--they may reflect the idiosyncracies of some one individual. Specimen N10E10 L5 (i.e. from the gravel) is a remarkably close duplicate of Ventana discoidal scraper, fig. 39 b, both being 36 mm. by 4 mm. and showing almost exactly the same angle of chipping around the outer periphery.

Tear-drop shaped end scrapers.

These artifacts are about 40 mm. in length and made on a curving flake. Three of them are made from a very light brown chert, and the other from a yellow-white chert. The light brown chert seems to be the same or closely similar in all³ of them, and no other artifact from the cave seems to have been made from it. Moreover, their tear-drop shape is unique. All this suggests a close ~~st~~ relationship between them, but there are also major differences. S5E5 L5/6^{*} is probably an old artifact from well back in the pre-pottery period; it is worked only on the original outer surface of the blade, and the point is not retouched in any way. The specimen N5E20^{L2} has been much more carefully worked, from both sides of the flake, and the point especially has been carefully retouched; it could even have been used as a projectile point, quite unlike the previous specimen. In all probability, if not dug up from lower levels, it is at least 2000 years later than the previous specimen. The specimen S5 L3 belongs to the pre-pottery period and, unlike the other two, ^{was} clearly in situ. It is worked on both sides, and has no point at all, so that strictly it is not 'tear-drop shaped'. In terms of the other material in the cave, it unquestionably resembles these two scrapers markedly, yet it is also surprisingly different from them on closer inspection. The fourth specimen, S5W30 L3, is from the gravel, somewhat smaller, and broken; it had been notched and cut back somewhat thinner on both sides just above the fracture point. It may have been either a scraper ~~or a~~ or a projectile point, but is classed here because it was made on a curving flake and

unifacially chipped on the outside of the original flake, thus resembling the oldest specimen of the other three. The distinction between unifacial and bifacial working is similar to that noted as possibly significant chronologically among the discoidal scrapers.

Miscellaneous small scrapers.

Small keeled scraper.

Oval base, very high keel, corresponding to Ventana domed discoidal scraper. 18-20 mm. diameter by 20 mm. high.

Bifacially chipped thin flake scraper.

41 mm. long by 28 mm. wide. Carefully worked on both sides. Base resembles an Abasolo round-base projectile point, but shape is a somewhat rounded rectangle, without a point. ~~No other scraper should be at all like this was found.~~ Possibly a knife, but equally unlike any of the knives. Unlike any Ventana specimens. *One other broken specimen with bifacial working is classed with this.*

Thin flake scraper or knife.

A simple flake, except for steep retouching along one edge. Closely resembles Ventana category of thin flake knives (as in fig. 41, e or f). Or may be retouched on two edges. ~~One~~ ^{Two} specimens ~~is~~ ^{are} retouched from one side along one edge, and from the other side along the other edge, ^{one} with a very small possible graver point left at one place. Some approach thumb-nail scraper category of Ventana.

Scrapers with apparent graver points.

These are rare and do not otherwise seem to form a ~~common~~ uniform type. Two are domed (32 mm. diameter by 17 mm. high, and 28 mm. wide by 44 mm. long by 28 mm. high) and two are flat, none showing much retouch.

Thumb-nail scrapers.

These two specimens are bifacially worked and one shows very fine retouching. One 25 mm. long, broken, the other 31 mm. long, unbroken. More work in making these than in the ~~bifacially chipped~~ thin flake scrapers.

Domed scrapers.

These two scrapers may belong with the keeled scraper above, although they are larger and relatively lower. (30 mm. diam. by 17 mm. high and 31 mm. diam. by 15 mm. high). Both are broken so that the bottom is now an approximate half circle, but it is not clear whether this is due to accident or to design in either case. The older one has a much more irregular edge than the later one.

Miscellaneous small scrapers (cont.)

Crude bifacially worked scrapers. These are flakes about 35 mm. to 50 mm. in their longest dimension, tending to be somewhat oval in shape, showing some traces of working on both sides, but not much on either side. Some of them are probably rejects. The ~~absence~~ absence of the fine, steep retouch found along the edge found in most of the better scrapers and many that otherwise would not even be recognizable as artifacts was one of the characteristics used to distinguish this sub-type.

Broken rock scrapers.

If these fragments of broken rock are artifacts, they are probably scrapers. The oldest is least likely to be an artifact, and the latest most likely to be an artifact. Their heights are from 12 to 18 mm., ~~maximum~~ lengths 40-46 mm. Very angular and crude.

Flattish unifacially worked scrapers. These are all flakes with one completely unworked face, the other almost unworked, without secondary chipping of any sort. 3 are roughly 5-sided, and the fourth is rectangular.

Small plano-convex end scrapers.

These scrapers are 13-~~7~~-17 mm. high, 33-39 mm. long, and 28-33 mm. wide at the widest point. They are well-made, but with no very fine chipping along the edge.

1. The first part of the report is a general introduction to the subject.

2. The second part is a detailed description of the methods used in the study.

3. The third part is a discussion of the results of the study.

4. The fourth part is a conclusion and a list of references.

5. The fifth part is a summary of the main findings of the study.

6. The sixth part is a list of the names of the authors and their institutions.

7. The seventh part is a list of the titles of the papers presented at the conference.

8. The eighth part is a list of the names of the speakers and their institutions.

9. The ninth part is a list of the titles of the papers presented at the conference.

10. The tenth part is a list of the names of the authors and their institutions.

11. The eleventh part is a list of the titles of the papers presented at the conference.

12. The twelfth part is a list of the names of the speakers and their institutions.

13. The thirteenth part is a list of the titles of the papers presented at the conference.

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17. The seventeenth part is a list of the titles of the papers presented at the conference.

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20. The twentieth part is a list of the names of the speakers and their institutions.

21. The twenty-first part is a list of the titles of the papers presented at the conference.

22. The twenty-second part is a list of the names of the authors and their institutions.

23. The twenty-third part is a list of the titles of the papers presented at the conference.

Miscellaneous small scrapers (cont.).

Thin-edged scrapers.

These two artifacts share a relatively thick body from which a much thinner section protrudes. The edge of the thin section has the very fine steep retouching characteristic of many scrapers.

Obsidian flake scraper.

This is an obsidian flake 22 mm. long by 13 mm. wide. A large nick has been made in one side, possibly for hafting and the working end has been carefully and steeply retouched with very fine chipping. One side also shows flakes off, but these look more like use scars.

~~Triangular scraper~~

~~This is a carefully worked scraper 25 mm. long and 16 mm. wide at the broad base of the triangle; which is thinned down to a thin sharp edge; and was presumably the working edge. It is about 6 mm. thick towards the point which is broken off.~~

Steep scraper.

This scraper is probably broken and actually belongs in a more conventional category. The flat working surface is 25 mm. long, but only 8 mm. wide at the widest point. The forward edge is curved, and shows probable use scars, or I would not have considered it an artifact. Its height from the working surface is 22 mm. and it goes back at an angle from the working surface. It may originally have been a discoidal scraper.

Thick thumbnail scraper.

I think there is a much better name for this type, but can't locate a reference to it. Bifacially worked by removal of

1. (a) The first part of the question is to find the value of x such that $x^2 + 1 = 0$.

2. (b) The second part of the question is to find the value of y such that $y^2 + 1 = 0$.

3. (c) The third part of the question is to find the value of z such that $z^2 + 1 = 0$. The fourth part of the question is to find the value of w such that $w^2 + 1 = 0$. The fifth part of the question is to find the value of v such that $v^2 + 1 = 0$. The sixth part of the question is to find the value of u such that $u^2 + 1 = 0$.

4. (d) The seventh part of the question is to find the value of t such that $t^2 + 1 = 0$.

5. (e) The eighth part of the question is to find the value of s such that $s^2 + 1 = 0$. The ninth part of the question is to find the value of r such that $r^2 + 1 = 0$. The tenth part of the question is to find the value of q such that $q^2 + 1 = 0$. The eleventh part of the question is to find the value of p such that $p^2 + 1 = 0$.

6. (f) The twelfth part of the question is to find the value of o such that $o^2 + 1 = 0$.

7. (g) The thirteenth part of the question is to find the value of n such that $n^2 + 1 = 0$.

8. (h) The fourteenth part of the question is to find the value of m such that $m^2 + 1 = 0$. The fifteenth part of the question is to find the value of l such that $l^2 + 1 = 0$. The sixteenth part of the question is to find the value of k such that $k^2 + 1 = 0$. The seventeenth part of the question is to find the value of j such that $j^2 + 1 = 0$.

9. (i) The eighteenth part of the question is to find the value of i such that $i^2 + 1 = 0$.

10. (j) The nineteenth part of the question is to find the value of h such that $h^2 + 1 = 0$. The twentieth part of the question is to find the value of g such that $g^2 + 1 = 0$. The twenty-first part of the question is to find the value of f such that $f^2 + 1 = 0$. The twenty-second part of the question is to find the value of e such that $e^2 + 1 = 0$. The twenty-third part of the question is to find the value of d such that $d^2 + 1 = 0$. The twenty-fourth part of the question is to find the value of c such that $c^2 + 1 = 0$. The twenty-fifth part of the question is to find the value of b such that $b^2 + 1 = 0$. The twenty-sixth part of the question is to find the value of a such that $a^2 + 1 = 0$.

11. (k) The twenty-seventh part of the question is to find the value of x such that $x^2 + 1 = 0$.

12. (l) The twenty-eighth part of the question is to find the value of y such that $y^2 + 1 = 0$.

13. (m) The twenty-ninth part of the question is to find the value of z such that $z^2 + 1 = 0$.

Thick thumbnail scraper (cont.)

large flakes only. Length 16 mm., height 10 mm., width 16 mm.

One surface relatively flat, the other sloping steeply, and responsible for nearly all the difference between the 10 mm.

~~edge~~ height at the back, and the edge at the front.

Flat-ended thin scrapers.

This is probably classification due to an accident which broke these scrapers, leaving a flat surface on one end, opposite the working edge. In shape these two scrapers resemble the thumb-nail category but are quite crudely worked. One is

made from a ~~flint~~ chert flake, the other from a flake of limestone.

The latter has a couple of scars which may be ~~either~~ use scars,

retouch, or accidental. It is difficult to distinguish in

limestone where the fracture planes are so dissimilar from

that of most chipped stone work. Flint one is 29 mm. wide

(in its morphological width) by 17 mm. long by 7 mm. thick.

Limestone one is ~~29 mm.~~ 30 mm. wide by 21 mm. long by 8 mm. thick.

Both rectangular in shape.

Small core scraper.

This should perhaps have been classed with the 'scrapers with apparent graver points', as it does have what looks like a

deliberately left projection, but this is so rounded that it

hardly deserves to be called a point. The shape is more domed

than anything else, but the under surface is very irregular,

partly due to an apparent fault plane in the stone. The domed

side has been worked by the removal of large flakes and ~~there~~ there

are small flake scars, probably from use, on the domed surface,

extending either way along the edge from the possible graver point.

Scrapers reworked from points (?)

There are two of these (if not more, unrecognized). Both could have been Tortugas Triangular, or some large stemmed point, with one side somewhat rounded off for a scraping edge. Their special characteristics probably derive from their having originally been points.

Knives.

These are a number of fragmentary artifacts usually somewhat thicker or larger than those classed as projectile points, although it is remotely possible that some of them had that function. Their mortality rate would seem to have been considerably higher than any other type of artifact found, so they would seem to have been used for rather rough work. It is possible that this is an artifact of classification, other artifacts being recognizably other things, and these drifting into one category simply because they are broken, but they do seem to differ from the projectile points in other ways, and that is the only other group with which they are likely to have been classified. They by no means resemble each other, but their fragmentary condition and few numbers make sub-classifications pointless. It is not clear why they would be so much~~th~~ less common than projectile points, or gravers, although their function may have been partly taken by the 'thin saw-like choppers'. Some of them when complete may have been somewhat like the artifact (Ventana fig. 53 g).

Drill.

Although the point is broken off, this artifact is almost certainly a drill. It is 16 mm. wide at the base, which is thinned to a sharp edge, and one side had been retouched for about 10 mm. near the base. The other side did not show this retouch. It is 25 mm. to the break, and its thickness there is about 5 mm. The width before the basal flaring starts is about 9 mm.

Winged flint.

This curious object is unfortunately broken, and it is impossible to restore its original shape. One wing is complete, and it comes down to a point; from this another wing projected off, at an angle which is not clear, but is unlikely to have been the same, relative to the point, as the unbroken wing. The point is rather dull, but the edge is carefully flaked and quite sharp. It may just possibly have been a drill, although the rather dull point does not really encourage such a belief.

Elongate chisel.

The sole artifact in this category is a piece of limestone, maximum length 122 mm., width at chisel end 52 mm., width at other end 28 mm., thickness ca. 10 mm. The chisel edge is formed by four steep concavities on the edge, giving a rather scalloped effect.

Smoother ?

This artifact is 95 mm. long, 10-16 mm. thick, 28-36 mm. wide. One surface has been used in such a way as to smooth it down noticeably. Unfortunately, this smoothed surface caused the ink to run, and only N10E5 is legible, the level being indiscernible.

Striated stone.

This artifact (?) is ca. 153 mm. long, ca. 53 mm. wide, ca. 27 mm. thick, with one surface relatively flat, the other high and rounded. On the rounded surface, from 32 mm. to 68 mm. from one end are eight striations, from 1 to 2 mm. across. They reach to the edge and are somewhat curved so that at the edge they are from 37 mm. to 90 mm. from the same end. One edge is considerably sharper than the other, and along that edge are traces of battering which could be due to use, but are certainly not decisive evidence of use.

Striated stone.

This artifact is a piece of limestone, maximum length 122 mm., width at widest end 32 mm., with an average width 26 mm., thickness 10 mm. The object is formed by four sharp conical points on the edge, giving a rather rounded effect.

Artifact 4

This artifact is 95 mm. long, 10-15 mm. thick, 20-25 mm. wide. One surface has been used in such a way as to smooth it down noticeably. Unfortunately, this smoothed surface covers the top to top, and only 10 mm. is visible, the level being irregular.

Striated stone.

This artifact (4) is 44.15 mm. long, 27 mm. wide, 27 mm. thick, with one surface polished flat, the other high and rounded. On the rounded surface, from 32 mm. to 48 mm. from one end are eight striations, from 1 to 2 mm. apart. They seem to be the same and are somewhat curved so that at the ends they are from 17 mm. to 20 mm. from the same end. One edge is considerably sharper than the other, and shows that edge and traces of striations which would be due to use, but are certainly not decisive evidence of use.

Adzes (*)

celT The two artifacts tentatively put in this category are not really at all alike. From the surface, a ground stone implement ca. 111 mm. long, 56 mm. wide, and 32 mm. thick is virtually flat-ended at one end, and at the other slopes gradually to a sharp edge, starting about 25 mm. from the end. The edge was somewhat sloping, and a section had been broken out of it. There are scars along the broken section which almost suggest that it was used subsequently for some purpose. The other artifact is much less orthodox in shape. The ink had largely rubbed off the surface, so it was impossible to determine whether it was from S10E20 L2, or N10E20 L2 with any surety, but since L2 in both of these squares corresponds to general level 2, it is of no great importance. The artifact is ca. 130 mm. long, 77 mm. wide and 21 mm. thick at one end, from which it slopes gradually to sharp a ~~pointed~~ and rounded end at the other. At 9 mm. from the point it is 26 mm. wide and 3 mm. thick. The 'pointed' end has five flake scars on it, although I would have expected it to be the hafting end, as it does not really look like a working point. Polishing facets are present on all surfaces.

Mano (**).

This was originally a polished stone artifact, subsequently broken and used as a 'flat scraping plane'. The shape may very well originally have been roughly rectangular. One surface has a very high polish (53 mm. by 59 mm. on the surviving surface); at nearly right angles to this is a surface ca. 35 mm. by 17 mm. (surviving) which has clearly been ground or polished down, but does not have the very high polish of the other surface. I would

(7) 25564

(31) Quesadilla

Mano (.) cont.

suggest that the one surface had only the polishing acquired in shaping, while the other had an additional polish acquired from de-fleshing skins or grinding seeds. Most of the sharp edges also had polish facets, formed subsequent to the breaking by whatever was its secondary use. N5E30 L7/8, from which the artifact came, is a low component of level 7, so the artifact is one of the oldest from the cave. As the only ground stone object from pre-ceramic levels it is of considerable interest, and it is most unfortunate that it was broken and re-used. Given the scarcity of leather objects from the cave, I think its most likely use was as a mano for grinding wild seeds.

Quartz, quartz crystals, and meteoric fragments.

Although not artifacts, all of these objects are clearly foreign to the cave and were presumably found elsewhere and carried to the cave by its human inhabitants. The fact that a large meteoric fragment was found in S5 L4 in quite close association with two fine quartz crystals suggests an association between them. It is quite possible that they formed part of a shaman's kit. A belief that rock crystals contained the souls of the dead has been recorded for Huichols and Pimas. On the other hand, such bright crystals always attract the attention of children, and it is not impossible that they are responsible for some of the crystals found.

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Shell Artifacts.

Pierced Snail Shells.

These are snail shells in which one hole has been pierced, probably for suspension. I had thought they might be beads, and the discovery of one strung on a piece of string confirmed this suspicion. The holes are simply broken through, not drilled.

Pierced turtle shell.

A section of turtle shell cut into roughly oblong shape, with one hole in it. The hole is at a natural thin point in the shell, and may not be due to artificial piercing.

Pierced clam shell.

This is a ~~highly polished~~ whole clam shell, with a rather large hole, probably cut in some fashion rather than drilled, and showing a high polish around the hole, as if it had hung suspended with that portion rubbing against its owner or his clothes.

Small shell rectangles.

These are cut pieces of shell. Two have two holes drilled in them, one at either end, one has one hole drilled in the centre of one end, and two have no holes in them.

1871

1872

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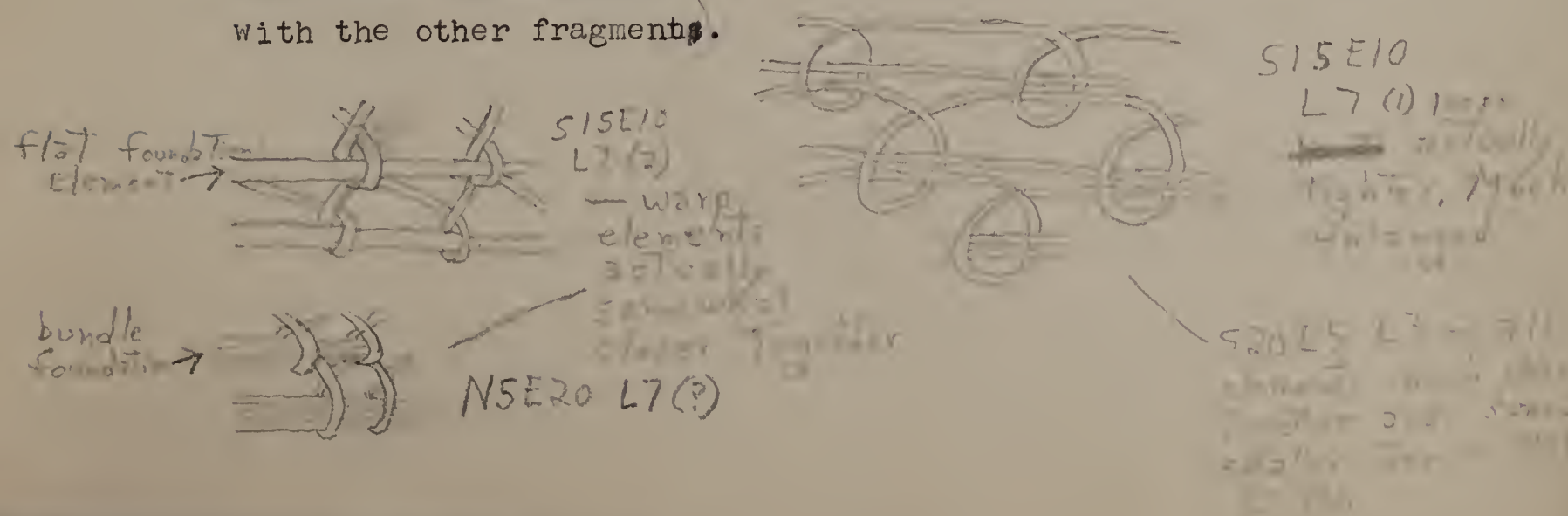
1878

1879

Basketry, Mats, Bags, etc. Since function is often difficult to distinguish in broken fragments, the various fragments are classed according to techniques of manufacture, and notations are made individually if an object seems clearly to be a mat, bag, or basket.

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Coiled netting basketry technique. This is a simple coiled netting technique, to which a warp element has been added, lying in the loops which also hold the net element from below. Considerable diversity was achieved through varying the size of the warp element relative to the weft elements, varying the absolute size of warp and weft elements, ~~and~~ varying the point at which the weft element from below was looped in, and varying the size of the interstices left. It seems to have been used both for quite loose* bags and for stiff-sided flat containers, rather like an out-size wallet. The specimen S15E10 L7⁽¹⁾ was apparently some sort of large bag. All elements of the body are about the same size. The edge is finished off in the same technique, but with string rather than individual fibres, and with the elements pulled considerably tighter. Throughout the body, the distance was about 2-3mm. between loops. The specimen is badly broken. At one point along the edge, a fibre knot had been tied around the edge (simple overhand) and a length of sennit was tied on next to it. (ca. 310 mm. long, described separately). The other large fragment similarly had a fibre knot with a length of fibre and next it a knotted length of sennit, but in this case the sennit seemed to be worked into the edge, rather than simply tied on as seemed to be the case with the other fragments.



Coiled netting basketry technique (cont.).

The specimen S20E5 L3 is a very small fragment, with somewhat smaller elements, pulled tighter than those of S15E10 L7 (1).

S15E10 L7 (2) has much stiffer and larger warp elements pulled tight^{er} together. A piece of the work has been folded back on itself and fastened together, but this was almost completely broken so the method of fastening was not clear.

It was probably by a coiling technique, threading a single piece of fibre through the loops of the last row on both sides. It was originally more than 145 mm. long and more than 90 mm. wide, but it is impossible to say how much more. Presumably it was some sort of container, but its flatness makes it seem somewhat unsuitable. Its stiffness and flatness make it resemble a piece of mat, and if the binding along the edge had not been found, it would probably have been considered that.

The following is a description of the specimen S20E5 L3. It is a small fragment of coiled netting basketry, made of a single piece of fibre. The fragment is about 145 mm. long and 90 mm. wide. It is made of a single piece of fibre, which is threaded through the loops of the last row on both sides. The fragment is folded back on itself and fastened together. The fragment is made of a single piece of fibre, which is threaded through the loops of the last row on both sides. The fragment is folded back on itself and fastened together. The fragment is made of a single piece of fibre, which is threaded through the loops of the last row on both sides. The fragment is folded back on itself and fastened together.

Coiled Netting Basketry Technique (cont.). A fragment in this technique was also found without a label. Examination of the field notes (p. 13) shows that in N5E20 L7 parts of a 'netted mat' and what may have been a basket were found together. The 'netted mat' is almost certainly the specimen of 'Lark's Head Knotted Basketry Technique' (which I was here comparing with the 'Coiled Netting Basketry Technique' specimen from S15E10 L7 (1)) and the 'basket' is the unlabelled fragment. It is almost the only piece found in the cave that I would have described as a basket at the time I found it, and there is no other fragment from this square from any level which could fill the description. The small size corresponds (16 mm. by 24 mm.). The fact that this impressed me as a basket rather than a 'netted mat' is due to the fact that the foundation element is multiple, a bundle of about six grass stalks, and the courses are pulled much tighter together than S15E10 L7 (1) and the impression is of a much stiffer object. The effect is quite different either from the S15E10 L7 (1) specimen, where the foundation element is exactly like the binding element, or from S15E10 L7 (2) where the elements are similar to each other, but the flatness of the foundation element determines the shape whereas the equally flat binding element, since it is being coiled, has little effect.

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Lark's head knotted basketry technique. In this technique, the warp elements are stiff and round, like the stalks of some types of grass. Along the edge, the weft elements made lark's head knots over the last warp element and came back. A single weft could easily have been worked back and forth, making a lark's head first at one end, then at the other. One fragment done in this technique ~~is~~ has unfortunately lost its label.

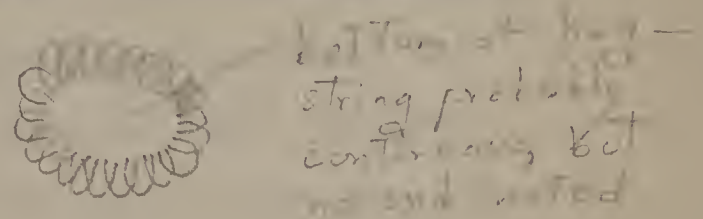
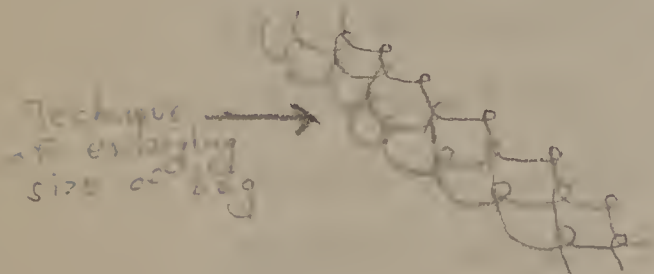
I at first thought, because of the associated seeds etc., that it belonged to the last day of the dig, square S15E10 L7, but the other fragments in this technique are from N5E20 L6/7. The associated seeds are unlikely to be anything other than the general L7. There are vegetable materials below this in this square, but they are probably somewhat earlier than, or subdivisions of the general L7. Since the small seeds are found with both fragments, it seems likely that both come from the same square.

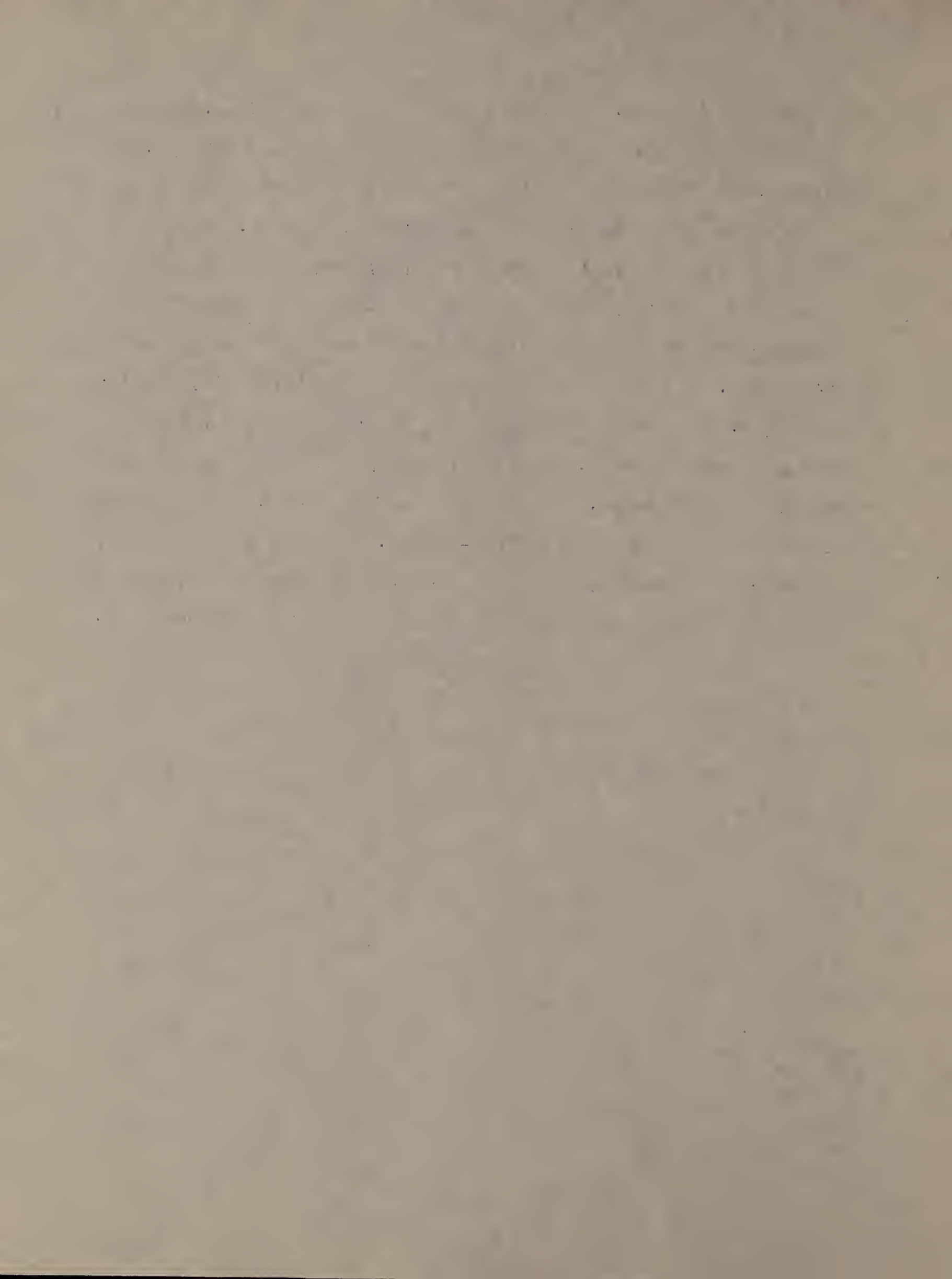
INSERT above: Unfortunately, no fragments show more than one edge, so this can only be a surmise.



The loops on the left
A small triangular hole is left.

Coiled Netting Bag. This is a small bag about 110 mm. in diameter, which must originally have been nearly spheroidal in shape. Size was increased by looping a string twice around the string below, where normally it would be looped only once. A small circular hole was left at the bottom, clearly the point from which work started, but it was impossible to determine its precise nature without cutting the specimen which did not seem warranted. A single set of loops surrounded this hole, and the string of the rest of the bag was tied to these loops, rather than worked from them. A heavier string ran along the outside of the bag for aways. It was fastened at both ends, and probably could not have served as a draw-string. A still larger string, knotted and dyed red, is tied into the bag at one point, but the end was broken off and its purpose could not be determined.





Simple Plaited Basketry. This is the simple checkerboard weave, with little to note about it save the size of the elements and the fashion of making the edges. An edge is found only on S15E10 L7; here two edges were preserved, done in different techniques. On one edge ^{an angled} ~~***rounded***~~ corner was produced by doubling an element at right angles upon itself, so that an element which had been running ~~horizontally~~ vertically ran horizontally. That end has a simple self-edge. The other end also has a self edge, but a foundation of four rods is inserted so that all elements go over two of them, and alternate elements go over four of them. The elements of this mat are from 7 to 16 mm. wide. Total former length must have been about ³⁷⁰ ~~370~~ mm., and the preserved width is ca. 190 mm., (which may even have been, originally, the length, as there is no indication how much of the mat may have remained). S10E5 L6a (a very fragile piece of matting) has elements ca. 2.5-3.0 mm. wide., and the remaining specimens have elements 3-6 mm. wide. N15E10 L2 has four thicknesses of each element. N5E10 and E10 L1b is a tiny mat, 62 mm. long by 35 mm. wide, with elements from 2-3 mm. across. It is woven diagonally with a self edge, and the loose ends have been left to dangle at one end, although the end is finished off.

Twilled Plaited Basketry. This is of two principal types, ~~two~~
over-two-under-two, and over-three-under-three. Specimen S10
(feat. 1)
L3 has both of these weaves and, in making the shift from one
to the other, over-four or under-four * occurs. The woven
material ^{was} folded back upon itself and fastened along the bottom
and along the other edge. The bottom is curved. The fastening
involved bending extra elements over the edge, weaving them on
themselves, and tying them with string apparently in a rather
haphazard fashion. From the bent edge to the tied edge at the
top of the under-three-over-three zone is 365 mm. From the
border between the ~~two~~ under-two-over-two and the under-three-
over-three to the bottom at the bent end is about 35 mm.,
and at the centre is about 100 mm. The width of the under-two-
over-two zone, above this, is over 170 mm., but the container
was destroyed in that direction. It was apparently some sort
of container, and the basic system of folding matting back on
itself is the same as that in the Coiled netting basketry
technique specimen S15E10 L7 (2). This would certainly have
been taken for a mat rather than a container, if the fastened
edge had not been found, and is one reason that all types of
matting and basketry have been classed together. The fact that
two weaves are found in a single specimen indicates that this
is not an important distinction in Level Three materials, but
the fact that no under-three-over-three basketry is found from
Level Two or Level One has led me to keep the distinction.
The specimen S10 L3 (2) is under-three-over-three in the body,
becoming under-four-over-four at the edge (the effect being
that of under-two-over-two in larger elements). Three edges
are partially preserved, one a simple self-edge, one a well-

done wrapped self-edge, and one a wrapped non-self edge which is considerably cruder, with ~~a~~ larger wrapping element^s, inserted irregularly. There are at least two wrapping elements, one sometimes acting as a bundle element. From this edge it is ca. 255 mm. ~~to~~ of under-three-over-three weave, and then more than 35 mm. of under-four-over-four weave, from which the fragment of wrapped self-edge had apparently been broken. The original width must have been greater than 260 mm. The technique of this wrapped self-edge is apparently the same as that of S10E10 L3b. This was apparently ~~a~~ made in under-two-over-two weave, with the ends of the elements split to double their number at the edge, making an effective under-four-over-four for purposes of making the edge. The piece is an edge fragment, and most of the elements are ~~to~~ split for the entire distance of the surviving length, but two of them are not, so clearly the body of the weave must have been under-two-over-two. The length of the fragment is ca. 375 mm. The edge is twice bent at right angles, but this appears to have been subsequent to discarding and accidental. Two specimens of simple under-~~over~~two-over-two weave may be from early levels. ~~to~~ S20E10 L3/16 was a mat lying at the bottom of a pit which I at first thought to be from L6, as it was slightly bell-shaped but which I subsequently decided was from L3. That was my considered opinion, and it was in the last square dug. Since the weave was used in conjunction with under-three-over-three, there is no reason to think that it may not have occasionally been used by itself. The specimen consisted of one large fragment ca. 280 mm. by 300 mm. and twelve small fragments, mostly in very poor condition, including

parts of a wrapped edge, in too poor condition to be sure of details (probably a self-edge, like that on ~~SE~~ S10 L3 (2)). The other possible ~~****~~ old specimen of simple under-two-over-two is N5E20 L2, which was at the very bottom of one of the big Level Two excavations, lying on gravel with some things that were probably L6 or L7. It is not impossible that it also belonged to that period, although I think it is more likely that it belonged to L2, as it is catalogued. There were many fragments, in bad condition, including some of a simple, unwrapped, self-edge. A simple self-edge is found on many of the later specimens of this technique. Specimen N5E5 L1 is a fragment of a corner with a self-edge, with a crossing at the corner of elements from the two sides. The resultant angle of the two edges is nearly 135 degrees. The remaining specimens contain nothing of special note.

Coiled Split-stitch Basketry. These fragments were all found in direct association with one another, and it was not until close examination that it was realized that they probably originally represented ^{three} ~~two~~ ^(or even three) artifacts. They are made on a multiple (bundle) foundation of grass, laid into flat courses. In ^{two} ~~one~~ ^(b, c) specimens, these are made about 2 mm. high by 2.5 mm. wide, and in the other ^(a) about 3 mm. high by 4 mm. wide. The stitches have a very pronounced leftward lean in all fragments. The specimen with the larger stitches ^(a) has one edge wrapped crudely with elements about 7 mm. ~~across~~ wide, which are probably the elements used for the binding stitch, giving a quite different affect because here they are not split. The large fragment (b) (ca. 480 mm. long) of ^{an} ~~the~~ other specimen has a very neat self-edge, while the small fragment ^{(the third artifact)(c)} (ca. 125 mm. long) has no preserved edge, although the top course at first gives the impression of an edge. The stitch is split on both sides in all fragments. All fragments appear to have been coated on both sides with asphalt. It was impossible to determine the work surface or direction of work from these specimens. The small fragment (c) does not have the foundation elements completely covered by the binding elements from below, as specimen b does. This could not surely be determined for specimen a, but it seems to be like ^c rather than like b.

Other Basketry Fragments. One of these, N5E10 L2, is a single course, a bundle (of grass stems or something of the sort) wrapped with a continuous flat element, with no evidence that it had been fastened either above or below, although presumably it had been. The other, S10E15 L2, seems to be a fragment of the wrapped edge of some sort of twilled plaiting, but details are not clear.

String. As I personally find the terms 'right twist' and 'left twist' confusing and apt to lead to mis-understanding, I have used the terms 'right thumb ^S up' and 'right thumb down' ^Z descriptive of the movements used in twisting the thread. In one strand thread, I have applied this to the twisting of the fibres. In two-strand thread, rather inconsistently, I have applied it to the twisting of the two strands upon one another, rather than to the twisting of the fibres. In four-strand thread, in this cave, two strands are individually twisted, right thumb up, and the two double strands are then twisted together, right thumb down. No attempt has been made to identify fibres. In one case, N5E15 L4, the strands are of different sizes, but in no other case is there an appreciable difference in the size of the strands. In the adjacent squares N15E10, N10E10, and N10E15, 164 fragments of yellow (cotton?) thread were found, the fragments being about 60 mm. long. Some were unravelled. Probably they had originally been parts of a single string, folded, and breaking at the folding point--at least this seemed to~~be~~ be true of some of them. The occasionally mis-leading nature of statistics could not be better exemplified than by counting each of these fragments individually, when they would seem to be the~~at~~ dominant type in L2, whereas all the other nine strings (13 frags.) from L2 are of a different type, and should clearly outweigh these.

String 'belt'(?),

This artifact is 14 mm. wide (complete) and ca. 140 mm. long (incomplete). It is made of yellow (cotton?) threads, ~~twisted~~ two strands, twisted * right thumb down. It is a plain weave with twelve weft elements, and continuous warp elements, passing from one side to the other.

Notes on fibrous materials, knots, etc.

N10E15 L2a is a coil of fibres, unknotted and unworked. The string from N10E20 L2 includes fragments which are looped as if formerly part of a net, although the string around which they were presumably formerly looped is now missing. The fragment of string from S15W30 L1a is coiled netting in which the active element is coiled once upon itself rather than simply passing. The coils are extremely tight and the artifact was obviously not used as a net, although it is ^aclearly netting.

From N5E10 and E10 L1c comes a piece of cloth made from string with twined weft elements, in one case stained red. Arising from the rim (*) is what seems to be a 3-strand sennit, bound at the end with a lark's head knot for whipping. Unfortunately this is only a small fragment. Another specimen which should probably be classed as cloth is the string from N15E10 L2, in the pit, where the weft is woven under 3, over 3 with fairly large pieces of string (ca. 1 mm. diameter). The weft elements eventually become warp elements, but some of the warp elements seem to be missing and the fragment is again too small for satisfactory analysis.

It should be noted that a square knot differs from a lark's head knot only in the stiffness of one of the elements. Topologically they are the same, and all sorts of intermediates may occur, although rarely do.

Notes on various specimens, etc., etc.

Specimen 12 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 13 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 14 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 15 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 16 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 17 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 18 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 19 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 20 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 21 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 22 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 23 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 24 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 25 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 26 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 27 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 28 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 29 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 30 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 31 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 32 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 33 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 34 is a shell of *Tridacna*, somewhat and somewhat.

Specimen 35 is a shell of *Tridacna*, somewhat and somewhat.

Knotted Palm Frond. This curious object may be a sandal, and it is difficult to think what else it could be, but if so it was the only one found, which seems strange if they were in regular use. A single palm leaf has been tied around the frond about 290 mm. above the stem, and the remaining leaves doubled back upon themselves. Leaves from each side have been fastened in coiled netting technique, and others have been fastened with knots (cf. discussion of knots). ~~Att~~ schematic sketch below attempts to show the nature of the object, rather than reproduce it exactly.



Leather Object.

This is a fragment of leather, bent upon itself and tied by a fibre. If opened out, the diameter of the opening left would be about 20 mm. Lying flat it is 25 mm. It was probably the neck of a bag, most of which has disappeared. At the present time, the maximum extension from the knot is only 2 35 mm., and the opening at the (presumably torn) bottom edge is 45 mm. across, lying flat.

Mended Gourd?

This is the fragment of the shell of a gourd or some similar plant, which is pierced by two stiff fibres. Both are broken off on the inside of the gourd, and both curve back to about the level of the outside of the gourd from which they emerged, but in an area where the gourd is no longer present. Although very stiff, they look as if they had been used for mending or fastening two gourd sections. The edge near which they emerge is absolutely straight for 14 mm., and looks as if it may have been deliberately cut, in which case fastening would probably be a more accurate term than mending.

A note on string--not to be included with report.

Scotty and I divided string into two batches, as below. I do not see the basis of the division at this time. It does not seem to have been the direction of twist.

Batch A. *capt*

I. Twisted with right thumb moving down.

Surface, 3.

West Chamber, 2: S10W25 L3, S10W25 L1.

Level 1, 3: N5E10 and E10 L1b, N10E10 L1, N15E10 L1.

Level 2, 6: N10E15 L2a, N10E15 L2a, N5E30 L2, S10E5 L2, S20E15 L1
(*** 4 fragments), N20E15 L2.

Level 3, 1: S15E5 L2. *(found in profile)*

Unplaced (a note, not in my handwriting, says S15W10 see gray ash on profile, but neither that square nor any adjacent to it was dug).

II. Twisted with right thumb moving up.

Level 2, 1 batch: N10E15 L2b (30 fragments).

Batch B. *hwt*

I. Twisted with right thumb moving down.

No label, 1.

West Chamber, 1: S10W25 L1 (closely resembles 1 in batch A from same sq. and level--I can see no objective basis for separating them).

Level 2, 1: N10E10 L4/5 (prob.)

Level 3, 7: S10 L3, S10E5 L3, S15E10 L3, S10E5 L4, S15E10 L3, S10E5 L3, S20E10 L3/6/7.

Level 4, 1: S5E10 and E10, L4/6.

Level 5, 1: S5W5 L5.

Level 6, 2: S20E5 L3 (2 frags.), S20E5 L3 (found in cleaning profile)

Level 7, 4: S15E10 L7, S15E10 L7, S15E10 L7, S10E10 L7.
(single strand)

II. Twisted with right thumb moving up.

Level 6, 1: S10E5 L3.

Level 7, 1: S15E10 L7. *(single strand)*

III. Multiple strands (4).

Level 3, 2: E25 L2b, S15E10 L3 (4 frags.)

(in these, 2 strands are separately twisted together, right thumb up, and then the resultant strands are twisted together, right thumb down).

Other string, not in the two batches separated by Scotty and me.

Right thumb twisted down:

Level 1, 2*: N5E10 L1c (on bow), S10 L1 (on fire-tongs)

Level 2, ***3*: N10E20 L2 (3 frags., 2 ** looped around other
as if parts of a net), N5E15 L4, N15E10 L2 pit (a snarled-up
mess of small strings which may have been made into something)

West Chamber, 1: S15W30 L1a (string had been made into something).

Level 6, 1: S15E5 L3.

Right thumb twisted up:

Level 2, 2 batches: N10E10, L3 bottom (54 fragments), N15E10
L2 pit (80 frags.) (these 2 batches and the batch from
N10E15 L2b are all made of a yellowish fibre, probably cotton,
and all are in lengths ca. 60 mm. long; probably all came
from the same L2 pit, although this does not show up clearly
in the profile--in any case, they are all from adjacent
squares)

Four strands:

Level 7, 2: On 'Coiled Netting Basketry' S15E10 L7

Indeterminable:

Level 2, 1: N5E20 L2 (in bird-bone necklace, very delicate and
fragile).

2. The first part of the paper is devoted to a general discussion of the problem.

The second part is devoted to a detailed study of the case of a single particle.

The third part is devoted to a study of the case of a system of particles.

The fourth part is devoted to a study of the case of a system of particles.

The fifth part is devoted to a study of the case of a system of particles.

The sixth part is devoted to a study of the case of a system of particles.

The seventh part is devoted to a study of the case of a system of particles.

The eighth part is devoted to a study of the case of a system of particles.

The ninth part is devoted to a study of the case of a system of particles.

The tenth part is devoted to a study of the case of a system of particles.

The eleventh part is devoted to a study of the case of a system of particles.

The twelfth part is devoted to a study of the case of a system of particles.

The thirteenth part is devoted to a study of the case of a system of particles.

The fourteenth part is devoted to a study of the case of a system of particles.

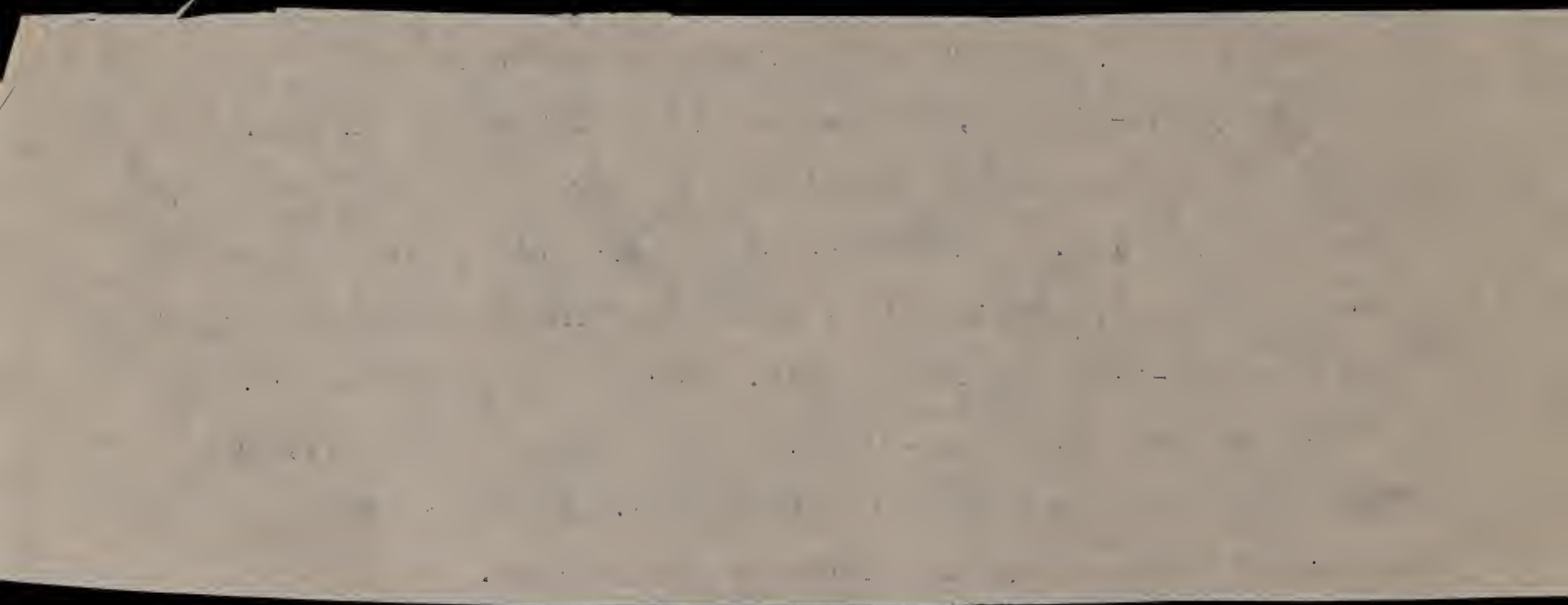
The fifteenth part is devoted to a study of the case of a system of particles.

Table shows the correlation of the levels of TMC 248 with the periods established by MacNeish for TMC 247, with summary notes on the material culture of the successive periods.

INSERT gravels

Above the gravels is a ~~***~~ fairly rich deposit of the Infiernillo period occupations in levels 6 and 7. Level 7 is a brown vegetable layer, like others in the cave, but level 6 is a distinctive yellow layer. It is widespread throughout the cave, and furnishes a good marker, but the conditions under which it was laid down have not yet been determined. 34 of the saw-like choppers which continue to be used throughout the cave's history, were found in these layers, as well as 9 other choppers of varied types. 13 humped scraping planes, 2 flat scraping planes, 2 gravers, and 3 gouges, one of the Clear~~er~~ Fork type were found in these levels. The true keeled subcategory of the humped scraping plane * seems especially typical, as 5 of them come from this level and only 2 from higher levels, a decided difference from the normal artifact distribution by levels. The lone ~~***~~ hammerstone from the cave comes from these levels. So also does a flat-surfaced thin pebble chopper which had been reworked from some other artifact with a polished surface. Judging solely from the form of the artifact, the best guess would be that it was formerly part of a rectangular mano. There is no other evidence of seed-grinding (or chile-grinding?) at this period, and further evidence is needed to prove the point, but I think it is likely that mano and metate were used sporadically by the Infiernillo people. ¶ There are ten basketry fragments tentatively assigned to these occupations.

The history of occupation of the two ~~caves~~ chambers is remarkably dis-similar, and neither is like that of TMC 247. Only in the earliest and latest periods were all three occupied, even occasionally. Reasons for this divergent history are not easy to suggest, although they make a fascinating problem for the functionally-minded archaeologist. Population pressure probably forced the occupation of all three chambers in late times, but before that the problem is one of choice. Some suggestions will be made in discussing the different occupations.



f.n. The term basketry is used in its broadest sense to include mats as well.

Four of the fragments are simple plaiting, such as continued until the latest period of occupation, but the other six represent two distinct techniques, neither of which is found in any of the later deposits. One of these is extraordinarily interesting, as it is an adaptation of the technique of coiled netting to make baskets, by the simple insertion of a foundation element. Certainly for this area at least, Holmes' contention that basketry originated from netting looks very plausible. Although extraordinarily varied affects could be obtained with this technique, as the four remarkably dis-similar specimens show, the technique is not well adapted for close weaving. The other technique, which has the active elements make a lark's head knot around the final passive element, also suggests derivation from a more pliable medium where the lark's head knot would be more natural--in short, again from some sort of netting.

In marked contrast to the numerous crude stone implements and the relative abundance of basketry (1/5 of all found) is the paucity of small chipped stone artifacts such as projectile points, knives, and small scrapers--only 6 out of 148 in all--which seems even more remarkable when it is realized that 6 of the 18 artifacts attributed to the gravels belong in that category. This is the more unfortunate as these are the types most frequently used by archaeologists in attempting cross-cultural comparisons of pre-ceramic cultures. The forms attested are a small diamond-shaped point, a Sandia type 1 point, ~~and~~ a lightly stemmed obsidian point which I have called *Almagre Stemmed* Valenzuela Stemmed, and a small core

scraper. There is no way of telling which, if any of them, are typical of the culture and which are ~~***~~ borrowed forms, or individual aberrations.

A taste for ornament is attested by at least two pierced snail shells, one of which is strung on a fibre and was clearly used as a bead. 10 string fragments reveal the use of single, double, and quadruple strands, and the single strands are ^{twisted} ~~woven~~ in both directions. Knots found are limited to square, overhand, and lark's head (which is topologically identical with a square knot). One atlatl fore-shaft was found, and one pounded wooden stake.

Broken bones attest a considerable dependence of the economy on hunting, which again makes the scarcity of projectile points remarkable. The complete absence of blades which could be used as knives suggests that ^{their} ~~there~~ presence was at least partially taken by something else, and simple bone fragments seem at least to be a plausible substitute. Numerous stems of the small wild chile pepper of the neighborhood attest that meat was already preferred highly seasoned, although the seasoning may have simply been popped into the mouth with the meat, rather than cooked with it. Cucurbita pepo, the domestic squash or pumpkin ^{and gourds, Lagenaria} seems to have been part of the plant assemblage, probably already domesticated. Some type of beans ^(perhaps wild) was also used.

The next occupation period of the cave is apparently a development out of the Infiernillo period. On the basis of the evidence from TMC 248 alone, it would not warrant a separate name, but would probably be ~~**~~ regarded simply as a poorly defined transition from Infiernillo to Flacco. However, on

TMC
the evidence from 247, it is set up as a separate period,
called ^{ocampo} (Portales--but this should be changed). If both
levels 4 and 5 actually belong to occupations contemporary
with (Portales) of TMC 247, then some innovations may be noted,
although many of them may simply be unattested earlier.
One section of a ^{strong} plant stem, possibly part of an atlatl,
is smeared with asphalt for a fastener. Unifacial side scrapers
and humped scraping planes occur out of proportion to other
artifacts. No less than 8 of the large stone artifacts
assigned to level 4 come from S10E5 L4. Unfortunately, the
stratigraphy of S10E5 is unusually complex and L4 may be anything
from an earlier component of the general level 3, to ^{an earlier} ~~attested~~
component of the general level 6. It is at any rate intermediate
between S10E5 L5, which is clearly the general level 7, and
S10E5 L3, which is pre-ceramic but of uncertain correlation like
L4. A tear-drop-shaped scraper assigned to L5 in the artifact
counts is of rather doubtful provenience. In any case, the
type is attested from the gravels of the west chamber and so
is probably earlier, although the one from level 3 is the only
one clearly attested in situ. The only projectile point found
coming from this period was a large Tortugas triangular found
in situ in what was clearly a level 5 deposit. One piece of
~~mat~~ mat, twilled over-three-under-three, likewise came from
the dubious S10E5 L4.

The level 3 deposits are again relatively rich and the
period name Flacco has been given to them. The general level
3 becomes, in some parts of the cave, two rich vegetable layers
separated by a thin ash layer, but in analysis this proved to

be too rare to be of any help in determining relative chronology. Here the relative amount of basketry found was greater than in any other level, although probably most of the material was actually from mats rather than baskets. A bag of coiled netting is included with the basketry. The fragments show simple plaiting, twilled under-two-over-two, twilled under-three-over-three, and interesting combinations designed to make patterns. The only projectile points found were two Langtry Stemmed. The numerically dominant stone implement, as in all other periods except the latest (level 1), was the saw-like chopper. ^{One} ~~Two~~ shell rectangles displays a rather surprising ability to work even edges at this relatively early date. It is not impossible that this was dropped by somebody from TMC 247 during the period when TMC 248 was not being inhabited, and scuffed in with the level 3 debris which was then on the surface, but there is no particular reason to make such an assumption. One fragment of exceptional interest may be from a bow, but is unfortunately insufficient to prove the use of the bow in this period, which would be an important addition to our data on the history of that useful but elusive weapon.

Following ~~periods~~ ^{San Lorenzo} the Flacco period, the cave was uninhabited until ~~San Antonio~~ times, i.e. from the beginning of Guerra times (which, on present evidence, may ~~be~~ well have been about 500 B.C.) to the end of ^{Palmillas} ~~San Lorenzo~~ times (probably some time between 1000 and 1400 A.D.). Undoubtedly during this long period people from the neighboring cave used TMC 248 occasionally. One sherd of Palmillas Engraved pottery came from this period, and other less recognizable artifacts may likewise have been dropped occasionally. However, there is no trace of a true

occupation at any time during this period, in any excavated portion of the cave.

The reoccupation of the cave occurred in San Antonio times. These people had a relatively crude pottery, the bow, cotton thread and intensive maize agriculture, coiled split-stitch basketry, plaited mats, and shell ornaments. The saw-like choppers were in extensive use, and Langtry Stemmed points had either continued in use since Flacco times or were re-introduced, as their presence in the west~~th~~ chamber attests. A bundle burial from early in the period was accompanied by deer-antler flint-knappers, mussel shells, and a large white corner-notched spear point. A (somewhat later?) child burial in the west chamber was without artifacts save for the mats which wrapped the child, still in a remarkable state of preservation. While the bundle burial had been an actual burial, the child was apparently simply placed upright in a corner of the cave, wrapped in mats, and a ~~few~~ little earth tossed over the mats. The analysis of the pottery is being undertaken by MacNeish in connection with the much more numerous sherds from TMC 247 of this general period.

The fact that both caves were occupied and that debris is extensive and divisible into two levels in TMC 248 as well as in TMC 247 suggests that population pressure was greater than at any other time during the history of the cave. The thick deposits of the west chamber point in the same direction. The different histories of occupation of TMC 247 and of the two chambers of TMC 248 present a very interesting problem in the different choices made by the people of the different cultures. The east chamber of TMC 248 is the most protected of all, but

by the same token the gloomiest and after the Infiernillo period deposits were laid down, its floor and roof were uncomfortably close together. That it should actually have been preferred to TMC 247 during Flacco times, as seems to be the case, strongly indicates a desire for protection, either from foes or from the weather. Since weapons are rare in the Flacco period deposits and mats are relatively common, I prefer at least tentatively to think that the weather in Flacco times may have been decidedly less pleasant. The west chamber would have compared unfavourably with the east chamber ^{or TMC 247} for protection at all times, and would have compared unfavourably with TMC 247 for comfort (the gravel underfoot would have made relatively unpleasant walking for the first inhabitants) and this probably explains why there was no habitation of any consequence until San Antonio times. However, the information ^{high} is not available for functional interpretations with any degree of probability.

The external relationships of the occupations which have been briefly described are difficult to delimit with precision because so little work has been done in nearby regions. The relationship to TMC 248 is obviously the most immediate problem. The San Antonio complex is clearly the same in both caves, although MacNeish's analysis of the pottery may suggest some minor differences, and it is not impossible that the lowest components in level 2 may actually correspond with San Lorenzo; however, the general correlation is clear. The complete absence of either pottery or maize in all levels below this makes it clear that level 3 must antedate the Guerra occupation of TMC 247. However Langtry Stemmed points occur in level 3 and do

not seem to occur in TMC 247 until Guerra times. As originally tentatively described by MacNeish (Final Field Report, Third Tamaulipas Archaeological Expedition) Guerra was regarded as developing out of (Portales) and the general character of the Flacco occupation corresponds to (Portales) in such elements as twilled basketry, choppers, scraper planes, and composite atlatl shafts. The large Tortugas triangular point of level 5 corresponds to those found in (Portales) times in TMC 247. All these elements suggest a period somewhat later than (Portales) as found in TMC 247, but still earlier than Guerra. As will be seen, comparative data from the Sierra de Tamaulipas bolsters this conclusion. Levels 6 and 7 seem quite clearly to belong to a distinctly earlier horizon. The diamond-shaped point of this horizon could belong to either (Portales) or Infiernillo ~~but~~ and the other two points definitely assignable to this horizon and so can furnish no direct evidence, but are not found in TMC 247; this, in itself, tends to point to Infiernillo times, since in (Portales) times the material is sufficiently abundant in TMC 247. Moreover, the number of choppers and scraping planes relative to the total artifact assemblage is much greater in the level 6 and 7 deposits than in (Portales) of TMC 247. The Infiernillo deposits of TMC 247 are relatively so scanty that I do not know whether a statistically significant comparison can be made. In any case this must wait for MacNeish's analysis of TMC 247. It is my decided impression, without yet having the figures from either cave to back it up, that bone is much more frequent in levels 6 and 7 * of TMC 248 than in any levels of TMC 247. The presence of twilled mats in Infiernillo of TMC 247 may be a significant

indicator that it is slightly later than levels 6 and 7 of
for which this feature is not attested
TMC 248, but the total basketry sample from TMC 248 is so small
that not too much weight should be put upon this. However, if
the total basketry sample from Infiernillo of TMC 247 is even
as great as that from levels 6 and 7 of TMC 248 and does not
contain either of the two special techniques of those occupations,
I would consider that this made it most unlikely that the two
were exactly contemporaneous. Presumably the materials from
the gravels are again somewhat older than the earliest permanent
occupations but not necessarily much older. If the materials
from the gravels are considered as forming a rough unit with
levels six and seven, I would say that this definitely goes back
farther than the Infiernillo occupation of TMC 247 and that this
is fairly probable for level seven as well. At the present time,
subject to MacNeish's detailed comparison of the materials from
the two caves, I see no objection to considering ~~both~~ all these
materials as essentially one unit, which may be called Infiernillo.

The external relationships of these two series of cultures
present some very difficult problems. MacNeish has maintained
that (Portales) is culturally the equivalent of La Perra of the
Sierra de Tamaulipas, except that it lacks corn. Excavations in
the southern Sierra de Tamaulipas subsequent to the excavation of
TMC 247 revealed a ~~cave~~ sequence in which La Perra was followed
by a culture in which very large Tortugas Triangular points
and Langtry Stemmed points became the dominant types, which has
been named Almagre, and seems to correspond with Flacco, which
also has Langtry Stemmed points. This re-enforced the equation
of (Portales) and La Perra. A C-14 date which must refer to

The first part of the paper discusses the importance of the study and the objectives of the research. It also mentions the scope of the study and the limitations. The second part of the paper discusses the methodology used in the study. It mentions the data sources and the statistical methods used. The third part of the paper discusses the results of the study. It mentions the findings and the conclusions. The fourth part of the paper discusses the implications of the study. It mentions the policy recommendations and the future research. The fifth part of the paper discusses the conclusion of the study. It mentions the overall findings and the final thoughts. The sixth part of the paper discusses the references. It mentions the sources used in the study. The seventh part of the paper discusses the appendix. It mentions the additional information provided. The eighth part of the paper discusses the bibliography. It mentions the list of references. The ninth part of the paper discusses the index. It mentions the list of topics covered. The tenth part of the paper discusses the glossary. It mentions the definitions of terms used. The eleventh part of the paper discusses the list of figures. It mentions the visual representations of data. The twelfth part of the paper discusses the list of tables. It mentions the tabular representations of data. The thirteenth part of the paper discusses the list of equations. It mentions the mathematical formulas used. The fourteenth part of the paper discusses the list of symbols. It mentions the notation used. The fifteenth part of the paper discusses the list of abbreviations. It mentions the shortened forms of words. The sixteenth part of the paper discusses the list of acronyms. It mentions the shortened forms of phrases. The seventeenth part of the paper discusses the list of initialisms. It mentions the shortened forms of words starting with the same letter. The eighteenth part of the paper discusses the list of contractions. It mentions the shortened forms of words joined by an apostrophe. The nineteenth part of the paper discusses the list of colloquialisms. It mentions the informal expressions used. The twentieth part of the paper discusses the list of idioms. It mentions the phrases with a meaning that is not literal. The twenty-first part of the paper discusses the list of proverbs. It mentions the sayings that express a general truth. The twenty-second part of the paper discusses the list of maxims. It mentions the principles or rules of conduct. The twenty-third part of the paper discusses the list of aphorisms. It mentions the short, pithy statements of truth. The twenty-fourth part of the paper discusses the list of epigrams. It mentions the short, witty statements. The twenty-fifth part of the paper discusses the list of epigrams. It mentions the short, witty statements. The twenty-sixth part of the paper discusses the list of epigrams. It mentions the short, witty statements. The twenty-seventh part of the paper discusses the list of epigrams. It mentions the short, witty statements. The twenty-eighth part of the paper discusses the list of epigrams. It mentions the short, witty statements. The twenty-ninth part of the paper discusses the list of epigrams. It mentions the short, witty statements. The thirtieth part of the paper discusses the list of epigrams. It mentions the short, witty statements.

either (Portales) or Infiernillo from TMC 248 is 3945 years old, plus or minus 334 years. As MacNeish points out, this date about 1900 B.C. nicely supports his equation with La Perra, dated at about 2500 B.C. A C-14 date from the Falcon dam for Repelo remains which are virtually La Perra without evidence of corn is ca. 2700 B.C. However, this presents important difficulties with regard to the corn. The first corn in the Sierra Azul sequence is found in Guerra times and is Bat Cave corn, of an early sort, without teocinte ingression; yet if (Portales) is ca. 2000 B.C. or later and has to be followed by Flacco before Guerra times, and Guerra is directly followed by Mesa del Guaje, probably commencing not earlier than 200 B.C., then Guerra probably begins not earlier than ca. 1600 B.C. and quite possibly as late as ca. 500 B.C. The Bat Cave corn which is found is decidedly more primitive than the Early Nal Tel corn of La Perra about 2500 B.C. and yet must be presumed to be 1-2000 years later. It must also be decidedly later than early Bat Cave corn at Bat Cave, which goes back to ^{about} ~~4000~~ 4000 B.C. (which is, however, an even more primitive form than that of Guerra). However, the C-14 dates jump from the period about 4000 B.C. to a period about 800 B.C. in a supposedly unbroken and continuous deposit, with the corn* evolving steadily. It is not improbable that the type of Bat Cave corn found in Guerra corresponds to that dated about 800 B.C. in Bat Cave. There is no way yet of determining whether the maize represents a backwash down the Rio Grande drainage and along the foothills of the coastal plain, or whether the Guerra people got it from the source from which it ultimately reached Bat Cave (if it was not wild in the local region around the plains of ^{Spain} ~~San~~ Augustine).

However, on the present evidence, the equation of La Perra and (Portales) seems fully justified. Since La Perra seems to develop naturally out of Nogales and (Portales) similarly develops out of Infiernillo, the equation of Infiernillo and Nogales seems to follow naturally. One of the tools from the gravels, the pebble smoother from the west chamber, is a type which in the Sierra of Tamaulipas is restricted to Nogales times, and the general tool assemblage of Infiernillo parallels that of Nogales, although there are a number of specialized local features. Nogales seems to have been * very widespread in the coastal plain at least as far north as the Rio Grande, and presumably has a long time span, as it is present in the 70-foot terrace at Falcon, as are mammoth bones.

The wider relationships of the Tamaulipas materials, and particularly of those from TMC 248, are still not at all clear, but the Infiernillo complex seems to represent the continuation of an old complex which had largely gone out of ^{existence} ~~use~~ elsewhere. Besides the round-based and triangular points which connect it with La Perra and Nogales, several other point types are found. Both diamond-shaped and concave-based points are found, and reflect a different tradition from Nogales. The trace of tangs on the concave-based point from the gravels suggests a variant of the Pinto point, and Pinto points are found with Chiricahua-Amargosa II materials in Ventana cave, as are diamond-shaped points. The most puzzling point in the Infiernillo levels is the Sandia type 1. The date of these at Sandia is about 20,000 years and, in the light of the present C-14 dates etc. it is ~~most~~ unlikely that the date of the specimen from Infiernillo

is much earlier than about 2500 B.C. Hibben (1941, pp. 31-2) mentions briefly that the type has been found from SE Colorado to central Texas, especially from the southern Plains, but the chronology here is not known. A considerable portion of the chronological gap may be filled when the finds from Texas are dated. The crude stone work may eventually be of considerable help in establishing cultural affiliations when terminology and typology have been ~~***it~~ more firmly established. The closest usable sequence reporting similar tools and giving even rudimentary statistics on artifact types is that in Ventana Cave, which is probably at least 1000 miles away by any really feasible route, and the only relatively nearby area where pre-ceramic artifacts have been found is the Valley of Mexico, only 120 miles away as the crow flies, but with mountain barriers in between that probably make it effectively more difficult to reach than Ventana Cave from southwestern Tamaulipas.

they are

For what ~~***it~~ worth, the following rough equivalences between the Ventana and Infiernillo artifact types are given:

Infiernillo	Ventana
large unifacial side-scrapers	rough-flake scrapers and some 'flake knives'.
pebble choppers	core choppers
bifacial saw-like choppers	flake choppers
gouge	hollow scraper (this category is not too close)
unifacial scraping planes	planes
flat scraping planes	rough-flake side-scraper.

Valenzuela

On first comparing the Ventana and ~~Infiernillo~~ artifact assemblages, the resemblances stand out markedly, but I have become convinced that this is largely because the comparable material from other regions is still not adequately classified by any system. The artifact percentages are strikingly dissimilar; the perishable material largely belongs to the upper levels in Ventana, where the resemblances to the stone artifacts of Valenzuela's Cave are less marked, but even so it is astonishing to find 114 pieces of basketry and 653 pieces of cordage balanced against 972 projectile points and knives from the same layers when Valenzuela's Cave shows 50 pieces of basketry, 52 pieces of string, and only 84 projectile points and knives. From the volcanic debris ~~and the~~ came 90 stone artifacts, 6 being planes, as were 4 out of 54 stone artifacts in the red sand, i.e. about 7% in each case. The comparable category in TMC 248 comprises 13 out of 71 stone artifacts of the Infiernillo period, more than 18%. Bifacial choppers, 34 out of ⁷¹~~90~~ Infiernillo stone artifacts, or about 48% are an important feature of the assemblage, while the equivalent Ventana flake choppers ~~represent only~~ from the volcanic debris are only 2 out of the 90 artifacts. Surprisingly, the small number of points from the Infiernillo occupation, 4 out of 71 stone artifacts, is nonetheless greater than the number of those from the volcanic debris in Ventana, only 2 out of 90 in very marked contrast to later periods in Ventana. (cf. 21 out of 54 in the succeeding red sand) Neither of the two points found would be at all out of place in a Nogales assemblage, despite the 'Folsomoid' affinities claimed by Haury.

The percentage dis-similarities of the volcanic debris become|even more marked in the red sand and midden deposits. Planes account for only 3.1% of flaked stone tools in the Ventana midden ~~an~~ deposits, as opposed to the 18% of Infiernillo. Projectile points, less than 6% of Infiernillo stone artifacts, furnish 28.1% of the artifacts in the midden. It seems to me a decidedly peculiar factor that the culture presumed to be most dependent on hunting, the Ventana complex of the volcanic debris, has, percentage-wise, by far the fewest projectile points. I have already pointed out a similar anomaly in the presence of large quantities of bone in the Infiernillo deposits. Flake choppers form less than 1% of the ^{flaked stone} artifact assemblage from the Ventana middens, as opposed to the 48% of Infiernillo stone artifacts. Hammer stones ^{are} 12.1% of Ventana midden deposits, ~~and~~ but only 1 of the 71 stone artifacts from Infiernillo is in this category, and it is the only 1 in the entire 457 stone artifacts from the cave. On this again the Ventana volcanic debris seems closer to Infiernillo than to later periods in Ventana, as only 2 of the 90 stone artifacts from that level are hammerstones. The other artifacts from the midden do not allow statistical correlation with those from Infiernillo as the categories do not seem sufficiently close to those used in analyzing the Infiernillo materials, even when individual artifacts are quite similar.

The Ventana culture has sometimes been compared with the so-called 'Chalco culture' of the Valley of Mexico and MacNeish has suggested possible connections between Chalco and Nogales. The evidence for the existence of such a culture

consists of 7 artifacts from the Totolzingo formation at Chalco and of 3 artifacts from the Totolzingo formation at Tlatilco. Caliche III and the De Terra believes that the Totolzingo formation was in process of formation from 8000 to 2000 B.C. Ten artifacts from two localities, spanning 6000 years, can only be called a complex by completely misunderstanding what is usually meant by that term. To pad out the 'complex' with such artifacts as manos and metates found on the surface and completely unattested for the period and area concerned can only be condemned as at best a type of wishful thinking which should have no place in any scientific study, although not particularly ~~un~~objectionable in writing a ~~novel~~ fictional story of the period. Aveleyra points out (p. 98) that of the ten 'artifacts', one is almost certainly not an artifact and 4 others are simple flakes with little signs of human utilization. A point found in the Totolzingo formation at Tezoyuca has some claim to be regarded as approximately contemporary. The two definite ~~Chalco~~ artifacts from Chalco are both plano-convex scrapers, corresponding closely to the humped scraping planes of the present report. However, much more digging will have to be done in the Valley of Mexico in the Totolzingo formation before comparisons can profitably be made.

For the other periods of occupation in ~~the~~ TMC 248 the only comparison of importance which can be made is of the Langtry Stemmed, important in Flacco, Almagre and Repelo sites in ~~Tex~~ Tamaulipas and Pecos River sites in Texas, with the Gypsum point and with the Augustin point of Bat Cave. Judging from the C-14 dates, the latter would seem to be about 4000 B.C. which compares with the Gypsum-like point of ~~Ventana~~ Chiricahua-

Amargosa II for which Hack's dates of 4000-2000 B.C. seem strongly supported by the ~~the~~ available C-14 dates (cf. Ventana Cave, p. 528). If the Maravillas focus, which precedes the Pecos River focus, is correctly equated with Ventana-Amargosa I, then the dates of the Pecos River focus are not apt to begin too much later than those of Chiricahua. A date about 2700 B.C. for Repelo is well within the period when Langtry Stemmed was probably in use in Texas, and probably is considerably earlier than the dates which must be assigned to Almagre and Flacco, where the tradition apparently lasted until San Antonio times. The dates and distribution suggest that the points spread into ~~the~~ southern Tamaulipas from the north, and that the long-lived Repelo tradition may have been responsible.

The date range and distribution of these Gypsum points offers an extremely interesting parallel to the period of differentiation of the Hokogian linguistic stock. Groups related to Hokan were, in historic times, the possessors of much of Tamaulipas and Texas as well as large portions of California. Recent studies by Swadesh indicate that these groups were diverging from one another about 3000 to 1500 ~~a~~ B.C. and that the relationship extends through all the southeastern linguistic groups, including Muskogian; Gypsum-like points are present in at least much of this area often at about the right date. This suggests that it would at least be profitable to examine other cultural elements which might be associated with a spread of Hokogian speakers about 4000-3000 B.C. or somewhat later, and the California-Nevada regions where the Gypsum point is probably the end of a long tradition seem a good place to look, but this is not the place for such an

extended survey. Before the hypothesis could be accepted, a check should be made of the shared faunal and ^{floral} artifactual vocabulary of Hokogian groups to see how it coincides with the culture of the period, although even this is not likely to give fully adequate evidence in such a wide-spread group.

A completely different set of linguistic data suggests that a different and earlier influence associated with California should also be considered in looking for cultural parallels to the Tamaulipas materials. Nal-tel maize in historic times is associated entirely with Huastec and Maya * speakers; the maize is a direct derivative of that found at La Perra, only a short distance north of the Huastec country. The maize may have been borrowed by Mayan groups moving into the lowlands, but if the La Perra people were Maya speakers, a whole series of possible cultural affiliations appears. The Totomayan group, including Totonac, Mixe, Huave, and Zoque as well as Mayan were differentiating about 2500 B.C., i.e. in La Perra times; one test might be to see whether they all share a cognate term for corn. Since the Totomayan group is related to Penutian, and La Perra apparently develops directly out of Nogales, a good place to look for parallels to Nogales would be in Californian and Oregonian cultures, particularly in any which do not seem to belong to the general Gypsum tradition.

These ^{hypotheses} ~~suggestions~~ of possible associations between linguistic and archaeological data are meant only as suggestions of possible contacts, but the double fact that we are beginning to get dates for linguistic differentiation and that we are beginning to have a considerable amount of data on archaeological cultures

of comparable dates indicates that we can no longer avoid considering the fact that a linguistic relationship implies a cultural relationship of considerable magnitude. To accept this in no way implies a belief that there must always be a continuous association between a given culture and a language. In the case of Hokogian and the Gypsum point, the cultural tradition from which the point was derived could have been associated with a completely different group from the speakers of ancestral Hokogian, who then borrowed it and diffused it widely, and such differing traditions would in no way affect the hypothesis of a connection between the two at the level being considered, any more than subsequent borrowing of the point ** by non-Hokogian groups would damage it.

None of these artifacts are water-rolled and are unlikely to have been contemporary with the original laying-down of the gravels in the cave, unless the latter was due to seasonal deposition in a rainy period over a considerable period of time, and the general homogeneity of the gravel deposits does not favor such a view. Geological studies to determine when and how the gravels were laid down would be a useful project. The presence of a much finer layer of ~~apparently~~ apparently water-laid sand and gravel in small sections of the cave (see profile zero-zero to N5) actually overlying preserved vegetable materials does suggest seasonal activity but is very difficult to understand, as the water required to move the gravel would, one would think, be sufficient to destroy the vegetable materials. In any case, the source of the water to transport the gravel at a date recent enough to be later than the oldest gravels is a difficult problem, as the canyon floor is now far below. The artifacts found in the gravels have not been given a focus name, as it is by no means certain that they belong to even roughly equivalent time horizons, although it seems a priori unlikely that they extend over a greater period than the Nogales culture of the coastal plain. Since only the pebble smoother and the specific projectile point types are lacking in later periods, it is not improbable that the artifacts represent an early component of the Infiernillo culture.

However, a chi square probably should not be used on this data, since the expected probability in three of the levels is less than 5, and such small samples may easily be skewed. The probability that 8 of the 16 should be in level 2 is nearly 30%, although 12 would be expected. The statistics really do not give us too much help with regard to the round-based points, but if the 35 scraping planes of the ceramic period did all come up from below, then it is not unlikely that the 16 round-based points did as well. ~~It is possible that~~

The 28 choppers which did not fit into the 'saw-like' category are distributed with 14 in the ceramic levels and 14 in lower levels, but none in the west chamber. The sample is even smaller than the round-based points and only 2.5 choppers would be expected in the west chamber, if the saw-like choppers are taken as the norm so again the meaning of the distribution is not clear. The six from the surface skew the sample even more than the round-based points are skewed. About all that may be concluded is that it is not safe to conclude much about temporal distributions from such small samples except as regards earliest occurrence.

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of the supply of MINERAL OILS

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